

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

Screwworm Research Laboratory

P.O. Box 986

Mission, Texas 78572

January 8, 1973

Subject: Compensatory Time

To: All Employees  
Screwworm Research Laboratory

On January 4 I consulted with Mr. Taylor, at his office in Weslaco, regarding a standard policy relating to compensatory time for overtime work while an employee is on per diem. The following paragraphs summarize my understanding of the rules that will apply for our screwworm field travel.

Mr. Taylor and I expect that a senior scientist (GS-11 and above) doing research in which he exercises his own judgment regarding the execution of experiments will voluntarily work extra hours when his professional conscience so dictates. It is part of a professional scientist's academic freedom to design, execute and interpret the results of experiments within the scope of the broader research problems assigned by his supervisor. Therefore, a senior scientist (like all other ARS employees) is required to work 40 hours each week; but he has the freedom of choice to continue voluntary overtime if he wishes to do more than meet the minimum job requirements.

However, if a professional scientist does not wish to work longer than the official 40-hour work week and does so only because his supervisor requires it, then he can request compensatory time and will be granted it since legally he has the same privileges as a subprofessional GS employee. In such a case, the supervisor is responsible for designing the detailed experiment which involves compensatory time for a scientist.

A subprofessional or junior scientist (GS-9 or lower) does not have the academic freedom of a scientist. His supervisor designs the experiment and the subprofessional follows orders. Therefore, the subprofessional will be granted compensatory time if he requests it for overtime work to finish an assigned job. However, it is official policy that compensatory time be kept to a minimum so the senior scientist authorizing compensatory time should make certain that it is essential overtime and will make a note in his record book of the reason for each authorization of compensatory time.





Employees cannot be required to work overtime and be reimbursed only by compensatory time off later. Some organizations have budget arrangements for extra pay for overtime, but our screwworm project does not. Therefore, if an employee wants overtime pay and will not accept compensatory time, we will not send him on field travel where an emergency might compel extra work hours. It is understood that an employee volunteers to work overtime for compensatory time if necessary, otherwise we will not send him out on per diem for field work.

The regulations require that Wage Board employees get overtime pay for overtime work. They cannot volunteer to take compensatory time instead. Therefore, we cannot send wage board employees on field travel since we do not have the funds to pay overtime and could not give them compensatory time.

Many subprofessional employees have a truly professional attitude and have just as much scientific curiosity as a senior scientist. Therefore, if a GS-9 or lower has so much interest in his work and such a desire for accomplishment that he voluntarily donates overtime to do more than his supervisor requires, we will appreciate the extra effort. Such examples of professional interest and job dedication will be noted and considered when any employee is being evaluated for promotion. However, we will not require that an employee donate overtime, and we will not discriminate against a person who otherwise does a good job in his regular 40 hour week.

It should be noted that any employee working overtime for compensatory time should first get the approval of his supervisor because the supervisor is required to certify that the compensatory time is essential and write a full explanation if an inspector requests one.

Not all extra hours in the field rate compensatory time. For example, the 40-hour work week can be spread out over 6 days to get Saturday or Sunday work done without involving overtime.

There are quoted below excerpts from appropriate Administrative Memoranda:

"AM 402.1, 8/14/72, VIII SCHEDULING TRAVEL DURING REGULAR TOUR OF DUTY

- To the maximum extent possible, official travel shall be scheduled within an employee's regularly scheduled workweek. It is recognized that, in some cases, no amount of planning or scheduling will prevent an employee's being required to travel outside his regularly scheduled workweek. When this is necessary, the employee will be compensated for such time in accordance with AM 402.2, provided the conditions specified therein are met. If an employee is required to travel outside his regularly scheduled







workweek under circumstances which make the travel time noncompensable (see AM 402.2), the official concerned must record his reasons for ordering the travel at those hours, and must, upon the request of the employee, furnish the employee a copy of his reasons. In carrying out the requirements of this section (VIII), officials authorized to direct travel (see AM 103.1) are expected to take close, hard look at scheduling and planning travel. A record shall be maintained of all cases for which payments are made. Such records should, as a minimum, specify the number of hours involved and the cost, and should indicate whether or not such cost will be reimbursed. The documentation required in cases involving travel for which employees may not be paid overtime must provide clear justification for having ordered the travel. Such phrases as "more advantageous to the Government" or "more economical" will not be considered adequate.

AM 402.1, 8/14/72, III C Service Required During Hours Over Which ARS Has No Control.

1. Conditions Requisite to Establishment. Employees engaged in activities which may require service during hours over this ARS has no control (e.g., animal caretaking) may be assigned to nonstandard tours consisting of not more than six of any seven consecutive days in the basic workweek shall be made to consist of five consecutive 8-hour days. Where it is not practicable to establish a definite prearranged weekly tour, the authorizing official (2 below) shall fix, as the employees' basic workweek, the first 40 hours in a pay status in the administrative workweek (which is Sunday through Saturday), including, as appropriate, hours, worked, creditable holiday absence, compensatory time, and leave. (This 40 hours must occur during six and preferably five days of the administrative workweek.) In such cases, not more than 8 hours leave may be charged for any one calendar day, nor may any paid leave be granted after the first 40 hours in pay status in any workweek. (See AM 402.2 for holiday pay provisions for first 40-hour employees.)

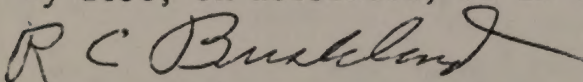
AM 402.2, 5/18/70, K Premium Pay for Time in Travel Status.

1 Away from Official Duty Station. Time in travel status away from official duty station is compensable as work only when

a It is within the regularly scheduled workweek, including scheduled overtime; or

b It involves the performance of actual work while traveling (example: nurse accompanying a patient to the hospital in an ambulance); or

d It is carried out under such arduous and unusual conditions that travel is inseparable from work (example: employee traveling to a forest fire, by foot, on horseback, or in the back of a truck over rugged terrain);"



R. C. Bushland  
Acting Research Leader

cc: E. A. Taylor







UNITED STATES DEPARTMENT OF AGRICULTURE  
ANIMAL AND PLANT HEALTH INSPECTION SERVICE  
VETERINARY SERVICES  
FEDERAL CENTER BUILDING  
HYATTSVILLE, MARYLAND 20782

January 24, 1973

**Subject:** Joint APHIS-ARS Methods Development -  
Research Field Study in Northeastern Mexico

**To:** J. L. Hourrigan  
Senior Staff Veterinarian  
Sheep, Goat, Equine, and Ectoparasites

During the week of January 8-13, 1973, Dr. Bushland, Dr. Meadows, and I discussed the plans and priorities for this work in Northeastern Mexico and agreed on the following:

First Objective--To monitor the effectiveness of the Mexican sterile fly release program this winter.

This should be done in areas of heaviest infestation between Valles and the mountains. According to Mr. Thomas "Bud" Fisher, this area is the heaviest breeding area. *morelos-Ocampo?*

This will be done jointly by Methods Development and ARS using test pens and also by collecting egg masses from cooperating ranches and collecting egg masses from official tick-dipping checkpoints. *APHIS MEXICO?*

At all times there will be a competent entomologist to classify all egg masses collected as sterile or fertile. *in NE Mexico*

We agreed that we need 70 percent sterility or better in order to achieve desired success.

Another area to be tested simultaneously will be a coastal area around Aldama. This area is historically one of the worst screwworm areas in the Mexican fly release zone. Aldama egg masses can be checked at Tampico or Cd. Mante.

*This information*  
Reason this is the first objective: Attainment of this goal will give us a 2-month forewarning of what will happen in Texas.

*no!*  
Second Objective--To evaluate the current plant strain in comparison with the new Texas strain, which was selected from 18 Texas ranches. Two 2500square-mile areas (50 X 50 square miles) will be used to test these two strains. One of these areas can be near the Aldama area and the other near Ocampo. At least three test pens will be set up in each area to serve as egg mass collection points. A Mexican strain may be tested later.







Third Objective--To determine whether the new entomological synthetic bait will attract both released flies established in nature as well as native Mexican flies to the trap. Will the new lure attract both males and females? Although this is third priority, this is something we can do now.

This combines with the first and second objective, and the third objective may be completed first. Mr. Jack Graham's advice is necessary to locate trap sites, but ARS people will do the bulk of the work.

Prior travel restriction on Mission, Texas, personnel limiting their travel to northern border States in Mexico must be relieved so Mission personnel can travel.

The above items must be completed in 60-90 days.

If it becomes necessary to request the services of several APHIS inspectors now assigned to Mexico, they should give top priority to these special studies.

After the above three high-priority items are completed, the following studies can be carried out later:

1. Swath width
2. Loading rates in fly release cartons
3. Fly feeding versus no feeding in release boxes
4. Large versus small fly release cartons

Dr. Bushland is assigning 3 ARS scientists and 2 bilingual technicians to this work. A minimum of 2 ARS scientists and 1 technician will be on site in Mexico as long as this special work continues.

In addition to the personnel from Mission who will be directing operations at the Tampico sterile fly distribution center, Dr. Meadows is committing the services of at least 1 entomologist and 1 technician from Mission to collaborate with ARS personnel in this endeavor.

All egg masses will be classified as fertile or sterile in the field and not sent by mail to Mexico City or Mission for determination.

Donald L. Williams  
Chief Staff Veterinarian  
Screwworm Eradication

Dr. A.A. Heflin, Mexico City  
Dr. N.L. Meyer, APHIS-EP, Hyattsville  
Dr. J.L. Wilbur, APHIS-VS, Hyattsville

cc:

✓ Dr. Lyman Henderson, ARS, Beltsville, Md.  
✓ Dr. R. C. Bushland, ARS, Mission, Texas  
Dr. M. E. Meadows, APHIS-VIC, Mission, Texas







notes for symposium  
presentation at San Antonio  
Feb 12, 1973

## I cooperative effort of

- a. ARS lab at mission
- b. Methods Develop. laboratory
- c. INIA - Chapingo & Cotaxtla
- d. APHIS livestock inspectors in Mexico.
- e. NASA group.

## II Current program in Tampico area - from Altamira - Aldama to Ocampo

- a. monitor program success -
  - 1. Current case incidence -
  - 2. Collection of egg masses, % sterility
    - a. sheep pens - 4-6 by USDA  
2-5 by INIA
    - b. rancher cooperation -
    - c. Sanidad animal - tick inspectors  
and scurworm inspectors -
  - 70% sterility - arbitrary criterion of success -
  - 3. Trapping records - wild vs. program -
- b. Test strains by field release
  - 1. Joe Finlay strain vs. NTS or  
perhaps program release
  - 2. Hydroponic vs. meat reared -

In areas near south edge, at  
least 70 km x 70 km -





# Fairway

## *Motor Hotel*

SOUTH TENTH AT WICHITA - 686-2445 - McALLEN, TEXAS 78501

EXECUTIVE OFFICE

McALLEN - REYNOSA INTERNATIONAL GATEWAY..... SHORTEST ROUTE TO MEXICO CITY



~~at~~ as possible, in the future,  
depending on man power + funds,  
test in the field -

1. swath widths -
2. loading rates - i.e., optimum no.  
of flies in box -
3. feeding vs. no feeding -
4. large vs. small boxes -

c. attractants testing -

d. NASA - Ground truth effort.

1. Drs. Chas. Barnes

Alejandro Theermann







2-16-73

phone call from  
Mrs. Morgan, Weslaco -

apparently total  
disbursements under  
current coop. agree-  
ment have been  
\$16,424

she estimates that  
\$23,180 is available  
as of Jan 1, 1973

u

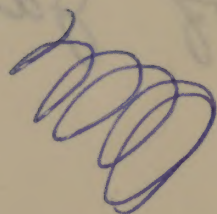
2-16-73

Phone call from  
Mrs. Morgan, Wheeler

Apparently total  
disbursements under  
current crop agree -

\$16,454

She estimates that  
\$23,180 is available  
as of Jan 1, 1973





GASTOS PROYECTO GUSANO BARRENADOR  
Marzo 1973 - Marzo 1974.

(Proyecto cooperativo I.H.I.A. - A.R.S.)  
PERSONAL

|            |            |
|------------|------------|
| Tecnico    | \$ 400.00  |
| Ayudante   | 160.00     |
| Ayudante   | 160.00     |
| Ayudante   | 160.00     |
| Ayudante   | 160.00     |
| Secretaria | 160.00     |
|            | <hr/>      |
|            | \$ 1200.00 |

GASTOS DE VEHICULOS

|                            |                   |
|----------------------------|-------------------|
| Amortizacion               | 320.00            |
| Gasolina y lubricantes     | 80.00             |
| Refacciones y mano de obra | 40.00             |
|                            | <hr/>             |
|                            | \$ 440.00 (Renta) |

MATERIAL DE LABORATORIO

|                              |           |
|------------------------------|-----------|
| Higado de res                | \$ 200.00 |
| Alimento para borregos       | 240.00    |
| Substancias quimicas y otros | 50.00     |
|                              | <hr/>     |
|                              | \$ 490.00 |

COMPRA DE BORREGOS \$ 80.00

RESUMEN

|               |             |
|---------------|-------------|
| POR MES       | \$ 2,210.00 |
| POR TRIMESTRE | 6,630.00    |
| POR AÑO       | 26,520.00   |

Nota: Existen aprobados para año y medio  
\$ 21000.00 aproximadamente.

DR. GRAHAM



ANEXO 20

PERSONAL  
Projecto cooperativo 141A - 1425  
Mazo 1913 - Mayo 1914

|             |            |
|-------------|------------|
| Técnicos    | \$ 400.00  |
| Ayudantes   | 150.00     |
| Ayudantes   | 150.00     |
| Ayudantes   | 150.00     |
| Ayudantes   | 150.00     |
| Secretarios | 150.00     |
|             | <hr/>      |
|             | \$ 1500.00 |

### COSTOS DE VEHICULOS

|                             |        |
|-----------------------------|--------|
| Amortización                | 320.00 |
| Gasolina y lubricantes      | 80.00  |
| Reparaciones y mano de obra | 40.00  |
|                             | <hr/>  |

\$ 440.00 (renta)

### MATERIALES DE LABORATORIO

|                              |           |
|------------------------------|-----------|
| Huiles de ser                | \$ 200.00 |
| Elementos para pruebas       | 240.00    |
| Substancias químicas y otros | 20.00     |
|                              | <hr/>     |
|                              | \$ 460.00 |

COMPRA DE BARRERAS \$ 80.00

### RESUMEN

|               |              |
|---------------|--------------|
| por MES       | \$ 2,210.00  |
| por TRIMESTRE | \$ 6,630.00  |
| por AÑO       | \$ 25,250.00 |

Nota: Entitan aprobados para otro mes  
\$ 2100.00 aproximadamente.



# Cotaylla

Coop. agreement 12-14-100-10653(33)

Approved  
1

9/3/70 - 6/30/72 -  
6/3/72 - 6/30/74

26,000

28,590

54,590

## SCL Records Expenditures

| <u>Period</u>     | <u>Amount</u>        | <u>Date Paid</u> |
|-------------------|----------------------|------------------|
| Dec 70<br>2/28/71 | Sept 3 -<br>Nov. 30  | ?                |
|                   | 3,080 (\$3230 - 150) | 5/31/71          |
| Apr. - Jun 30     | 4,104 (4304 - 200)   | 8/30/71          |
| Jul - Sept.       | 3,080 (3230 - 150)   | 12/31/71         |
| Oct. Dec, 1971    | 3,080 (3230 - 150)   | 3/31/72          |

1972

|            |      |         |
|------------|------|---------|
| Jan - Mar  | ?    |         |
| Apr. - Jun | 4150 | 4000?   |
| Jul - Sep  | 3573 | 9/30/72 |
| Oct - Dec  | 4183 |         |

25,250

29,130

25,460

54,590

25,250

Balance = 29,340

ask if this  
rep was submitted

Mrs Morgan

512-968-5533







# Catoytta

Figures from New Orleans.

To 6/30/74

\$54,990

| <u>Date Paid</u> | <u>Amount</u> |                           |
|------------------|---------------|---------------------------|
| 5/31/71          | 3,080         |                           |
| 8/30/71          | 4,104         |                           |
| 12/31/71         | 3,080         |                           |
| 3/31/72          | 3,080         |                           |
| 9/30/72          | 3,573         | N.O. Holding.             |
| 12/31/72         | <u>4,183.</u> | Not yet submitted to N.O. |
|                  | 21,100        |                           |

Balance

33,490









# COMISION MEXICO - AMERICANA PARA LA ERRADICACION DEL GUSANO BARRENADOR

LA ENERGIA ATOMICA AL SERVICIO DEL GANADERO

LEIBNITZ No. 20 - 12o. PISO

MEXICO 5, D. F.

DIRECTOR:

DR. MARCO ANTONIO VILLASEÑOR  
TEL. 531-65-96

CO-DIRECTOR:

DR. NORVAN L. MEYER  
TEL. 531-85-63

## MEMORANDUM DE CONVENIO

*Por medio del presente se acuerda que los Directores investiguen a la brevedad posible, los trámites necesarios para modificar los acuerdos que existen entre el Departamento de Agricultura de los Estados Unidos de América y el Tecnológico de Monterrey, el Instituto Nacional de Investigaciones agrícolas y otras dependencias, en caso de que haya más acuerdos que incluyan entre sus puntos al gusano barrenador del ganado.*

*Los Directores deberán sugerir la forma legal de lograr la modificación únicamente en lo referente a las actividades relacionadas con el gusano barrenador del ganado.*

*Los Directores deberán elaborar una lista de procedimientos y dependencias que deberán ejecutarlos, con objeto de que la modificación se haga:*

- a) Lo más rápido posible.*
- b) Por medio de las dependencias autorizadas.*
- c) Sin interferir en los otros puntos de los acuerdos.*

*Los Directores elaborarán un presupuesto detallado del incremento que representa en los gastos de la Comisión la integración de las actividades descritas anteriormente.*

## MEMORANDUM OF UNDERSTANDING

*It is hereby agreed that the Directors shall investigate as soon as possible the procedure to follow for modification of the Agreements between the United States of America Department of Agriculture and the Monterrey - Technologic, the National Institute for Agricultural Investigations and other agencies, in the event that further Agreements including screwworm among their topics shall come up.*

*Directors shall suggest the legal procedure to follow in obtaining this modification which shall be only as to that referring to screwworm related activities.*

*Directors shall prepare a list of procedures and of the Agencies which shall execute those so that the modification shall be effected:*

- a) As soon as possible*
- b) Through official agencies*
- c) Without interfering with other topics in the Agreements.*

*Directors shall prepare a detailed budget of the cost increase that the aforementioned activities shall represent to the Commission.*







Los Directores no tramitarán directamente con las dependencias correspondientes, a menos que reciban instrucciones específicas, y por medio de documentos sugerirán a los comisionados los procedimientos internacionales que deben seguirse.

Directors shall suggest to the Commissioners the international procedure to follow and no direct transactions with official agencies shall be made by them unless specific instructions in this regard are given.

### SECCION MEXICANA

### AMERICAN SECTION

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*Fecha*

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*Date*

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*Fecha*

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*Date*

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*Fecha*

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*Date*

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*Fecha*

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*Date*

México D. F. a 25 de octubre de 1973

Mexico City, Mexico October 25, 1973









# COMISION MEXICO-AMERICANA PARA LA ERRADICACION DEL GUSANO BARRENADOR

LA ENERGIA ATOMICA AL SERVICIO DEL GANADERO

LEIBNITZ No. 20 - 12o. PISO

MEXICO 5, D. F.

DIRECTOR:

DR. MARCO ANTONIO VILLASEÑOR  
TEL. 531-65-96

CO-DIRECTOR:

DR. NORVAN L. MEYER  
TEL. 531-85-69

CONCENTRACION DE TODAS LAS ACTIVIDADES RELACIONADAS CON EL GUSANO BARRENADOR DEL GANADO QUE SE ESTAN EFECTUANDO EN TERRITORIO MEXICANO, EN LA COMISION MEXICO-AMERICANA PARA LA ERRADICACION DEL GUSANO BARRENADOR.

Al establecerse la Comisión México-Americana para la Erradicación del Gusano Barrenador, y en base al Acuerdo del 28 de Agosto de 1972, se formó un organismo internacional con una gran fuerza y versatilidad, constituido con todas las bases legales para afrontar cualquier evento en el desarrollo de sus actividades.

Sin embargo, durante los trabajos que se efectúan en forma rutinaria nos encontramos con que algunas actividades que son de competencia directa de la Comisión, son desarrolladas por otras dependencias mexicanas que han celebrado convenios con el Departamento de Agricultura de los Estados Unidos de América.

Se ha encontrado, por ejemplo, que existe personal mexicano viajando por diversas entidades del país recolectando moscas (*Cochliomyia Hominivorax*, Coquerel) para diversos fines, por supuesto en apoyo de las investigaciones entomológicas de la planta en Mission, Texas.

INCORPORATION OF ALL SCREW-WORM RELATED ACTIVITIES IN MEXICAN TERRITORY TO THE MEXICAN AMERICAN COMMISSION FOR THE ERADICATION OF SCREW-WORM

A versatile and legally strong organization capable of facing any event in its activity development was formed with the establishment of the Mexican American Commission for the Eradication of Screwworm, Agreement of August 28, 1972.

Nevertheless, we keep finding in our routine work that some activities in the Commission field are being effected by other Mexican agencies having agreements with the United States Department of Agriculture.

For example, we have found out that Mexican personnel is collecting flies (*Cochliomyia Hominivorax*, Coquerel) for various ends from some country entities, needless to say, supporting the Mission Plant entomological investigations.







Es conocido por todos nosotros que el Tecnológico de Monterrey y el INIA (Instituto Nacional de Investigaciones Agrícolas), tienen firmados acuerdos cooperativos con el Departamento de Agricultura de Estados Unidos, que incluyen entre las cláusulas de trabajo, actividades claramente definidas como investigaciones específicas sobre el gusano barrenador del ganado. Estos acuerdos o su refrendo fueron firmados después del 28 de agosto de 1972, según los informes que tenemos.

Pués bien, durante el desarrollo del programa en el norte, se les ha dado todo género de facilidades a los grupos de investigadores, precisamente por que se carecía de fondos y consecuentemente de personal calificado; pero con el establecimiento de la Comisión queda también establecida la sección para el desarrollo de métodos o investigaciones. No vemos razón alguna para que las investigaciones en México sobre el gusano barrenador del ganado, se hagan fuera del control de la Comisión, ya que de sorganizan y duplican los esfuerzos.

La integración de estas investigaciones a la Comisión, se justificaría con el inciso (h) del punto 7 del Acuerdo del 28 de agosto de 1972, que señala como actividades de la Comisión: "Realización de otras actividades apropiadas relacionadas con la erradicación y la prevención del gusano barrenador del ganado en la República Mexicana".

Well known by all of us is the fact that Monterrey's Technologic and the INIA (National Institute for Agricultural Investigations) have signed cooperation agreements with the -- United States Department of Agriculture, including among the work clauses activities, clearly defined as specific investigations on screwworm. According to the information we have, these agreements or their endorsement were signed after August 28, 1972.

During the northern program's evolution and because of fund unavailability and thus lack of skilled personnel, all facilities were given to the investigation groups, but with the establishment of the Commission was also established a section for investigation and method development. We do not see any reason for having screwworm investigation in Mexico made outside Commission control since this disorganizes and duplicates the efforts.

Integration of these investigations to the Commission would be justified with paragraph (h) Point 7 of the -- August 28, 1972 Agreement defining as Commission activities: "Fulfilling other screwworm eradication and prevention applicable activities in the Mexican Republic".







*Por lo anteriormente expuesto, nos permitimos solicitar concretamente:*

*Que se hagan los arreglos necesarios para incorporar a la Comisión todas las actividades relacionadas con el gusano barrenador.*

*Based on the aforementioned, we precisely request:*

*That pertinent arrangements be made to incorporate all screwworm related activities to the Commission.*



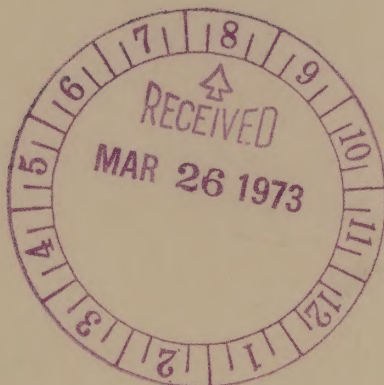
Based on the aforementioned, it  
is hereby recommended

that the Commission be authorized  
to incorporate all necessary  
amendments to the Commission.

For the reasons stated above, it is  
recommended that the Commission

be authorized to incorporate all  
necessary amendments to the  
Commission.





INST. NAL. DE INVEST. AGRIC.  
DEPTO. DE ENTOMOLOGIA  
603.35

Se informa sobre entrevista con funcionarios  
del Departamento de Agricultura de los E.U.A.

Chapingo, Méx. a 19 de febrero de 1973.

Dr. Francisco Gárdenas R.  
Director General  
P r e s e n t e.

ANEXO

Durante la última reunión de la Rama Surcoeste de la Sociedad Entomológica de América que se llevó a cabo en San Antonio, Texas, EUA, fui invitado a una entrevista para delinear planes preliminares de trabajo en relación al convenio que se establecerá próximamente entre el Departamento de Agricultura de los Estados Unidos (DAEU) y el INIA, sobre el gusano barrenador del ganado en áreas de la costa del Golfo de México. Estuvieron presentes en esta reunión el Sr. E.A. Taylor, Dr. G.H. Graham, Dr. R.S. Bushland, funcionarios de DAEU e Ing. Hermenegildo Velazco, Coordinador del Programa de Entomología del CIASE, además del suscrito.

A petición de los funcionarios citados, el Ing. - Velazco preparó un presupuesto tentativo sobre los gastos mínimos que serán - necesarios para iniciar esos trabajos, el cual me permito anexar al presente, en la inteligencia de que se incluyen conceptos que pueden modificarse una vez que se apruebe el subsidio correspondiente por las autoridades del DAEU.

En esta entrevista se hizo hincapié en la necesidad de contar con un vehículo nuevo para la realización de los trabajos en el Sur de Tamaulipas, y dada la imposibilidad de que el DAEU proporcione el vehículo, o de que se autorice la compra en una sola exhibición al efectuarse los informes correspondientes al convenio, se sugirió que el INIA compre ese vehículo y







gradualmente, en los informes trimestrales que rinda el INIA, se cargue una cantidad por concepto de renta de vehículo, calculado en todos sus aspectos (gasolina, lubricantes, refacciones, depreciación etc.) en base a un cierto kilometraje recorrido por trimestre.

Por otra parte, dado que de autorizarse el nuevo convenio no se contaría con los fondos correspondientes antes del próximo mes de julio, se sugirió también que los trabajos se inicien inmediatamente, utilizando parte de los fondos que todavía quedan del convenio vigente a la fecha.

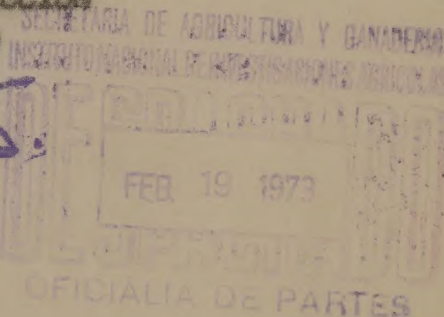
A solicitud de los funcionarios del DAEU presentes en la entrevista me he permitido poner bajo su conocimiento los principales aspectos discutidos en la misma, para que si juzga Ud. conveniente, gire instrucciones a quien corresponda con objeto de que estos trabajos se lleven a cabo.

ATENTAMENTE

SUFRAGIO EFECTIVO. NO REELECCION

JEFE SEC. CONTROL BIOLOGICO

*Jose L. Carrillo S.*  
DR. JOSE L. CARRILLO S.



- c.c.p. al C. Subdirector Técnico.-Presente
- c.c.p. al C. Subdirector Admvo.-Presente
- c.c.p. al C. Jefe Depto. Entomología.-Presente
- c.c.p. al C. Coordinador del Prog. de Entomología en el CIASE
- c.c.p. al C. Dr. G.H. Graham, P.O. Box 232, Kerrville, Tex. 78026, E.U.A.

JLCS:jom.



Por otra parte, cada que se autoriza el nuevo convenio no se confiere con las partes correspondientes antes del primer mes de julio, se sugiere también que los trabajos se inicien inmediatamente, utilizando parte de los fondos que todavía quedan del convenio vigente a la fecha.

A solicitud de las Comisiones del CARI, en las entrevistas se ha permitido poner bajo su consideración los principales aspectos discutidos en la sesión, para que el Jefe de Comisiones, en sus instrucciones a quien corresponda con objeto de que estos trabajos se lleven a cabo.

ATENTAMENTE

SECRETARIO GENERAL, NO REGISTRADO

DR. JOSE L. CARRILLO S.

*Dr. J. Carrillo S.*

DR. JOSE L. CARRILLO S.

c.c.p. al C. Subdirector Técnico, Presente

c.c.p. al C. Subdirector Administrativo, Presente

c.c.p. al C. Jefe Departamento, Presente

c.c.p. al C. Coordinador del Pro. de Investigación en el CIAT

c.c.p. al C. Dr. C.M. Gómez, P.O. Box 200, Santiago, Chile, 1950, D.O.A.

ALB: Jom.



GASTOS PROYECTO GUISANO BARRENADOR MARZO 1973 -  
MARZO 1974 PROYECTO COOPERATIVO INIA.-ARS,USDA

Presupuesto Mensual

PERSONAL

|                     |             |
|---------------------|-------------|
| Técnico- - - - -    | \$ 400.00   |
| Ayudante- - - - -   | 160.00      |
| Ayudante- - - - -   | 160.00      |
| Ayudante- - - - -   | 160.00      |
| Ayudante- - - - -   | 160.00      |
| Secretaria- - - - - | 160.00      |
| TOTAL               | \$ 1,200.00 |

GASTOS DE VEHICULOS

|                                     |           |
|-------------------------------------|-----------|
| Renta- - - - -                      | 320.00    |
| Gasolina y lubricantes- - - - -     | 80.00     |
| Refacciones y mano de obra- - - - - | 40.00     |
| TOTAL                               | \$ 440.00 |

MATERIAL DE LABORATORIO

|                                       |           |
|---------------------------------------|-----------|
| Hígado de res- - - - -                | 200.00    |
| Alimento para borregos- - - - -       | 240.00    |
| Substancias químicas y otros- - - - - | 50.00     |
| TOTAL                                 | \$ 490.00 |

|                             |          |
|-----------------------------|----------|
| COMPRA DE BORREGOS- - - - - | \$ 80.00 |
|-----------------------------|----------|

RESUMEN

|                        |             |
|------------------------|-------------|
| POR MES- - - - -       | \$ 2,210.00 |
| POR TRIMESTRE- - - - - | \$ 6,630.00 |
| POR AÑO- - - - -       | \$26,520.00 |

Nota: En la actualidad existen aprobados para año y medio aproximadamente \$ 21,000.00.

Todas las cantidades están citadas en dólares.



WABCO 1974 PROYECTO COOPERATIVO IZUA, -ARG, UROSA  
 GASTOS PROYECTO BUENOS BARRIOBARRIO MARZO 1973 -

Presupuesto Mensual

PERSONAL

|              |       |                    |
|--------------|-------|--------------------|
| Técnicos     | ----- | \$ 400.00          |
| Ayudantes    | ----- | 100.00             |
| Ayudantes    | ----- | 100.00             |
| Ayudantes    | ----- | 100.00             |
| Ayudantes    | ----- | 100.00             |
| Ayudantes    | ----- | 100.00             |
| Secretaría   | ----- | 100.00             |
| <b>TOTAL</b> |       | <b>\$ 1,200.00</b> |

GASTOS DE VEHICULOS

|                             |       |                  |
|-----------------------------|-------|------------------|
| Repuestos                   | ----- | 250.00           |
| Gasolina y lubricantes      | ----- | 50.00            |
| Petroleros y otros de otros | ----- | 40.00            |
| <b>TOTAL</b>                |       | <b>\$ 340.00</b> |

MATERIAL DE LABORATORIO

|                             |       |                    |
|-----------------------------|-------|--------------------|
| Reactivos de ensayo         | ----- | 500.00             |
| Alimentos para animales     | ----- | 500.00             |
| Substratos químicos y otros | ----- | 50.00              |
| <b>TOTAL</b>                |       | <b>\$ 1,050.00</b> |

COMPRA DE HERRAMIENTAS

|  |       |          |
|--|-------|----------|
|  | ----- | \$ 50.00 |
|--|-------|----------|

RESUMEN

|               |       |              |
|---------------|-------|--------------|
| POR MES       | ----- | \$ 2,210.00  |
| POR TRIMESTRE | ----- | \$ 6,630.00  |
| POR AÑO       | ----- | \$ 79,560.00 |

Nota: En la actualidad existen aproximadamente 10 y medio aproximadamente  
 \$ 21,000.00.

Todas las cantidades están en dólares.



Screwworm Research Laboratory  
P. O. Box 986  
Mission, Texas 78572

March 23, 1973

Subject: Screwworm Research--Tampico Area

To: E. A. Taylor, Area Director  
Subtropical Texas Area  
Weslaco, Texas 78596

Our Mission staff has been actively conducting field research in Mexico since January 9 when the APHIS Distribution Center opened. Dr. O. H. Graham has been there almost continuously, returning to Kerrville only twice for one-week breaks. In addition, we have had continuously on duty in Mexico one or two other entomologists and from one to three technicians.

The Tampico area work is conducted in cooperation with the Methods Development Section of APHIS with one or two entomologists from the APHIS staff working with our team at Tampico.

Highest priority has been given to measuring the effectiveness of sterile fly releases on the basis of percentage sterile egg masses collected from trap animals. Three pens were set up and stocked with wounded and artificially infested sheep at locations between Tampico and Aldama. Freshly castrated cattle were observed on ranches closer to Tampico near the town of Altamira. The majority of egg masses have come from castrated cattle.

The first egg mass was collected on February 15, and from then until March 21, we have accumulated the following data: 21 fertile egg masses and 18 sterile egg masses plus 16 cases of newly hatched larvae, representing masses laid and hatching during the interval between daily inspections. The accumulative total represents 55 egg masses with 18 sterile, for an average of 33% sterility.

It is generally agreed that screwworms increase about 5-fold each generation in the spring months when weather is favorable. Thus 80% sterility is required merely to keep a screwworm population from increasing. With the present rate of sterility, I expect screwworms to double or triple in numbers near Tampico in the four or five weeks required for a new generation at this time of year.







Thelma -

Please forward copy to  
Dr. Graham. Thanks.  
Quarta







9 APR 1973

Subtropical Texas Area  
P. O. Box 267  
Weslaco, Texas 78596

Telephone:  
512 - 968 5913

5 de abril, 1973

Dr. Francisco Cardenas Ramos  
Director General  
Instituto Nacional de Investigaciones  
Agrícolas  
Londres No. 40  
Mexico 6, D. F., Mexico

Estimado Dr. Cardenas:

El Servicio de Investigaciones del Departamento de Agricultura, EUA, está interesado en extender los trabajos cooperativos en Mexico sobre el gusano barrenador. El objetivo principal es de dar sustento directo a los trabajos cooperativos del campo (pruebas en el campo) para asistir al programa de erradicación sobre el gusano barrenador que se está llevando acabo conjuntamente por los Estados Unidos y Mexico.

Proponemos que este trabajo sea sostenido con una expansión del Convenio Cooperative No. 12-14-100-10653(33). Anticipamos trabajos climatológicos e ecológicos de dispersion y supervencia del gusano barrenador en varias zonas de Mexico con el proposito de correlacionar la actividad de dispersion, supervencion, y competencia de moscas esteriles con las condiciones del tiempo.

Si es conveniente con usted, el Dr. Hugh Graham y yo desearamos visitarlo a usted y sus oficiales en Chapingo el dia 12 de abril, a las 10:00 de la mañana para discutir en mas detalle estos trabajos cooperativos.

Atentamente,

*E. A. Taylor*

E. A. Taylor  
Area Director

cc:

R. C. Bushland  
Hugh Graham



9 APR 1973

Subtropical Texas Area  
P. O. Box 267  
Westaco, Texas 78256

Telephone:  
512 - 968 5913

2 de abril, 1973

Dr. Francisco Cardenas Ramos  
Director General  
Instituto Nacional de Investigaciones  
Agrícolas  
Londres No. 40  
Mexico 6, D. F., Mexico

Estimado Dr. Cardenas:

El Servicio de Investigaciones del Departamento de Agricultura, BUA, está interesado en extender los trabajos cooperativos en Mexico sobre el gusano barrenador. El objetivo principal es de dar sustento directo a los trabajos cooperativos del campo (pruebas en el campo) para asistir al programa de erradicación sobre el gusano barrenador que se está llevando a cabo conjuntamente por los Estados Unidos y Mexico.

Proponemos que este trabajo sea sustentado con una expansión del Convenio Cooperativo No. 12-14-100-10653(33). Anticipamos trabajos climatológicos e ecológicos de dispersión y supervencia del gusano barrenador en varias zonas de Mexico con el propósito de correlacionar la actividad de dispersión, supervencia, y competencia de moscas esteriles con las condiciones del tiempo.

Si es conveniente con usted, el Dr. Hugh Graham y yo deseáramos visitarlo a usted y sus oficiales en Chapingo el día 12 de abril, a las 10:00 de la mañana para discutir en mas detalle estos trabajos cooperativos.

Atentamente,

*E. A. Taylor*

E. A. Taylor  
Area Director

cc:  
R. C. Bushland  
Hugh Graham



Translation of Letter to Dr. Cardenas, dated 4/5/73

Dr. Francisco Cardenas Ramos  
Director General  
Instituto Nacional de Investigaciones  
Agricolas  
Londres No. 40  
Mexico 6, D. F., MEXICO

Dear Dr. Cardenas:

The Agricultural Research Service, USDA, is interested in expanding the scope of cooperative screwworm research in Mexico. The major objective is to provide direct research support in cooperative field tests to aid the screwworm eradication program now being conducted by APHIS and the Joint U.S.-Mexico Screwworm Eradication Commission.

We have proposed that this work be supported by an expansion of the research investigations under Cooperative Agreement No. 12-14-100-10653(33). We anticipate climatological and ecological studies of screwworms survival and movement in several zones in Mexico for the purpose of correlating dispersal, survival, and mating activity of released sterile flies with weather conditions.

If it is convenient, Dr. Hugh Graham and I would like to visit with you and your staff at Chapingo on April 12 at 10:00 am to discuss the cooperative research in more detail.

Sincerely,

E. A. Taylor  
Area Director







UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

Screwworm Research Laboratory

P. O. Box 986

Mission, Texas 78572

April 10, 1973

Subject: Screwworm Research--Tampico Area

To: E. A. Taylor, Area Director  
Subtropical Texas Area  
Weslaco, Texas 78596

On March 23 I sent you my first report on our field work near Tampico being conducted jointly with the Methods Development Section of APHIS at Mission.

The Screwworm Eradication Program has shifted fly release area boundaries northward because of the occurrence of infestations in Texas. On March 28 APHIS Field Operations made their last release south of Tampico. Since that date the southern limit of release is at the latitude of Tampico.

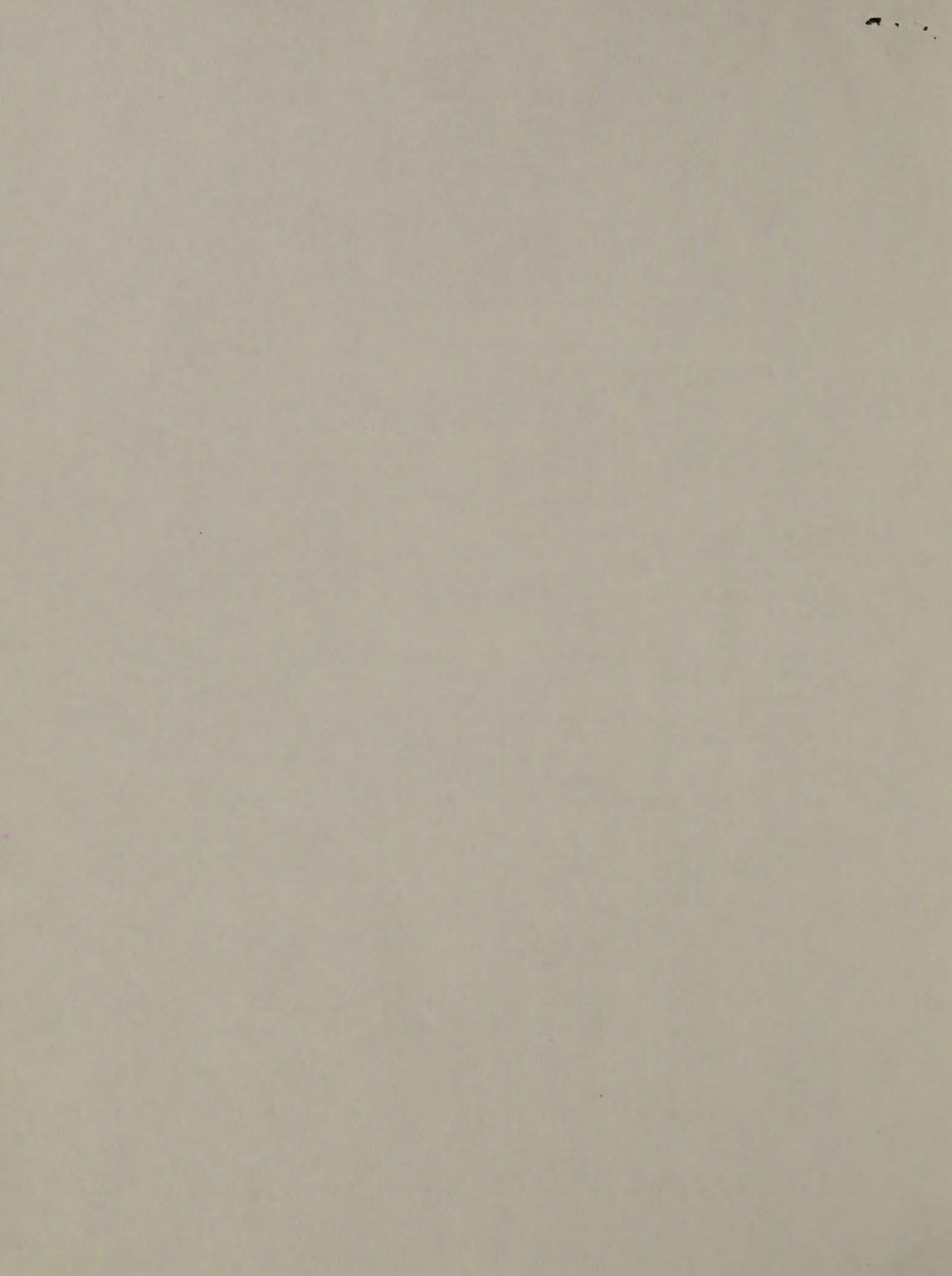
Because our egg mass collecting stations are so close to the southern boundary of sterile fly releases, I cannot interpret fertile egg mass records made after April 7. Fertile flies could emerge and mate south of Tampico and fly into the release zone to oviposit. The sterile males dropped on March 28 would have been old enough to mate with wild flies on March 31. The sterile male population south of Tampico would decline without additional releases in Mexico, but the wild flies ovipositing through April 7 should have been adequately exposed to sterile males. Therefore, I have tabulated all the egg mass records from the first collection made on February 15 to the end of last week. The table is attached.

Dr. Graham is continuing the egg mass records this week, but I will not know whether any fertile egg masses represent migrating flies or those that mated in the release area. (However, on April 9, he collected 2 egg masses and both were sterile.)

You will note in the attached table that the total number of egg masses from both cattle and sheep was 96 and that the sterility was exactly 50 per cent.

I mentioned in my earlier letter that Dr. Knipling and I have always proposed that, in the favorable weather of spring, screwworm populations







E. A. Taylor  
Screwworm Research--Tampico Area

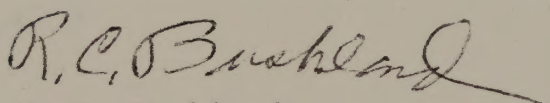
2.  
April 10, 1973

increase at a rate of about 5-fold each generation. If we are right in that assumption, then 80 per cent sterility is required to merely keep a population from increasing during the spring months.

Since the Tampico observations indicate only 50 per cent sterile matings, I would expect the population to double in the Tampico area during the next month even though releases were continued at the same rate. As we cannot get valid data at the extreme end of the Tamaulipas release area, we need continuing records from further north. Therefore, working with the help of APHIS inspectors, we are establishing new trapping sites and egg mass collecting locations in the general area of the highway from Victoria to La Pesca. Our technicians have started collecting eggs from castrated cattle near Soto La Marina and La Concepcion. (Two weeks ago our technician collected 5 sterile and no fertile egg masses from a ranch near Soto La Marina. Last week the weather was unsuitable (windy, cool and rainy) for fly activity and no eggs were collected.)

I hope that the wild fly population in northern and central Tamaulipas will be sufficiently low to be overwhelmed by mating competition from sterile flies. We are making every effort to get valid data. In the meantime, I am worried about the inadequate mating competitiveness of the released flies. Mr. Eddy's spot checks of trapped flies indicate that wild flies in the Tampico area were outnumbered 300 to 1 during the period March 1-7 and about 1000 to 1 March 15 to 21.

The trapping records compared with the egg mass data indicate that an abundance of sterile flies were released in March, but they were not adequately competitive in their mating with wild flies.



R. C. Bushland  
Research Leader

cc: In duplicate--for your forwarding to Dr. Cox  
Dr. Villasenor  
Dr. Meadows  
Dr. Graham  
Dr. Henderson  
Dr. Klassen







# EGG STERILITY RECORDS -- TAMPICO AREA--1973

| Week<br>Ending | Egg Masses Collected From |         |               |         | Total Masses   |                |
|----------------|---------------------------|---------|---------------|---------|----------------|----------------|
|                | <u>Sheep</u>              |         | <u>Cattle</u> |         | <u>Fertile</u> | <u>Sterile</u> |
|                | Fertile                   | Sterile | Fertile       | Sterile | Fertile        | Sterile        |
| Feb 17         | 0                         | 0       | 3             | 2       | 3              | 2              |
| 24             | 0                         | 2       | 1             | 2       | 1              | 4              |
| Mar 3          | 3                         | 0       | 0             | 0       | 3              | 0              |
| 10             | 2                         | 4       | 7             | 3       | 9              | 7              |
| 17             | 1                         | 2       | 19            | 2       | 20             | 4              |
| 24             | 0                         | 2       | 2             | 2       | 2              | 4              |
| 31             | 0                         | 5       | 0             | 4       | 0              | 9              |
| Apr 7          | 1                         | 6       | 9             | 12      | 10             | 18             |
| Total          | 7                         | 21      | 41            | 27      | 48             | 48             |

Mar 24-  
Apr 7

12 31 or 72%  
sterile







*Madam*

ANNUAL WRU REPORT AND PLAN FOR FY 1974

MAY 1973  
03

1. Work Reporting Unit: 401-7204-11990 | Screwworm Biology and Control.
2. Location: Screwworm Research Laboratory  
Subtropical Texas Area  
ARS-USDA  
P. O. Box 986  
Mission, Texas 78572
3. Contribution of WRU to RA Visualized Technology (Objective):
  - (a) The overall objective of the research is to support the current Southwestern Screwworm Eradication Program conducted by APHIS and to support the joint US-Mexico Screwworm Eradication Program now being organized.
4. Changes in Direction of Work from FY 1973 to 1974: Greater emphasis on the ecology, population dynamics, and genetics of various screwworm populations in Mexico.
5. Specific Objectives for FY 1974:
  - (a) Monitor effectiveness of APHIS Screwworm Eradication Program in the US and Mexico.
  - (b) Cooperate with APHIS on improving eradication techniques.
  - (c) Develop new colonies of flies genetically fit for Southern Mexico.
6. Plan of Work for FY 1974:
  - (a) Monitor effectiveness.
    - (1) Trap screwworm flies. Ratio of wild to released will show whether wild flies are properly overflooded with sterile ones.
    - (2) Determine sterility of egg masses laid by wild flies. Percentage sterility will show whether adequate numbers of competitive flies are released.
  - (b) Develop improved techniques.
    - (1) Study screwworm ecology in all the varied habitats of Mexico.  
CUAUHTEMOC - La Gloria -
    - (2) Collect egg masses to start colonies representing various regions of Mexico. ✓







6(b) Continued.

(3) Using these new colonies, study the physiology, biochemistry and genetics of Mexican flies and evaluate under laboratory and field conditions the compatibility and competitiveness of strains to be sterilized and released.

7. SMY for FY 1973 and 1974:

| <u>Scientist</u>              | <u>Grade-<br/>Step</u> | <u>Title</u> | <u>SMY<br/>FY 1973</u> | <u>Estimated<br/>SMY FY 1974</u> |
|-------------------------------|------------------------|--------------|------------------------|----------------------------------|
| R. C. Bushland <sup>1/</sup>  | 1606                   | Entomologist | 0.8                    | 1.0                              |
| G. W. Eddy <sup>3/</sup>      | 1507                   | "            | 0.9                    | 0                                |
| O. H. Graham <sup>2/</sup>    | <del>1504</del> 1506   | "            | 0.8                    | 0                                |
| B. G. Hightower <sup>4/</sup> | 1404                   | "            | 0.2                    | 1.0                              |
| M. M. Crystal                 | 1403                   | "            | 1.0                    | 1.0                              |
| C. M. Jones                   | 1305                   | "            | 1.0                    | 1.0                              |
| R. R. Grabbe                  | 1202                   | Chemist      | 1.0                    | 1.0                              |
|                               |                        | Total        | 5.7                    | 5.0                              |

<sup>1/</sup> Reported for duty September 20, 1972.

<sup>2/</sup> On temporary duty from Kerrville, Texas, Laboratory.

<sup>3/</sup> retired ± June 1 <sup>4/</sup> reinstated, ± May 1, 1973

8. WRU: 401-7204-11990

| <u>CRIS WORK UNITS</u>     |                               |                                   |                                                               |
|----------------------------|-------------------------------|-----------------------------------|---------------------------------------------------------------|
| <u>Number</u><br>(Field 5) | <u>Title</u><br>(Field 7)     | <u>Termin. Date</u><br>(Field 30) | <u>Percent of WRU<br/>Resources Allotted<br/>to Each CRIS</u> |
| HO 202                     | Screwworm Biology and Control | 040676                            | 100                                                           |
|                            | :0410                         |                                   |                                                               |

Total 100

9. Funds for FY 1974:

|                         | <u>Planned Base for FY 1974<br/>(Based on FY 1973 ARS 425)</u> | <u>Plans for FY 1974<br/>(From Project Plan<br/>Budget Estimates)</u> |
|-------------------------|----------------------------------------------------------------|-----------------------------------------------------------------------|
| (401) Regular Funds     | \$240,300                                                      | \$252,000                                                             |
| 304-7204-11990          | 75,000                                                         | 0                                                                     |
| (408) Reimbursements    | 0                                                              | 0                                                                     |
| (993) Misc. Contributed | 0                                                              | 0                                                                     |
| Total                   | 315,300                                                        | 252,000                                                               |

10. Planned Duration of this WRU: &gt; 10 years.







11. Progress in FY 1973:

a. CRIS Work Unit Progress Report (AD 421).

(1) HO 202, Screwworm Biology and Control, 0410.

(a) With the first failure in 10 years of the Eradication Program to protect the Southwest from screwworms, research support was increased to determine the cause and develop new techniques to insure success of eradication efforts. Egg masses laid by wild flies on cattle in South Texas were found less than 40% sterile during the summer and fall of 1972. In the spring of 1973, egg masses were about 50% sterile in Tamaulipas although fly trapping showed a ratio of more than 300 sterile to 1 wild. This indicated inadequate mating competition by released flies. A new ARS strain of screwworms was established and turned over to APHIS for mass rearing for joint field trials now underway. Laboratory studies indicated mating compatibility of strains from Mexico, Puerto Rico, and Texas. Genetic and physiological studies are underway to develop more vigorous, long-lived and competitive strains.

(b) Publications.

Crystal, M. M. 1972. Chemosterilization of male screwworm flies by immersion: changes in susceptibility with time of treatment; permanence of sterility, and effect of treatment on survival. J. Med. Entomol. 9(6): 509-510.

Crystal, M. M. 1973. Chemosterilization of screwworm flies: modification of action by temperature. Environ. Entomol 2(1): 145-147.

(c) Invitational Papers and Technical Presentations.

Bushland, R. C. Leader. Symposium on the status of screwworm research and eradication. Featured at a general session of the Annual Meeting of the Southwestern Branch, Entomological Society of America; San Antonio, Texas; February 1973.

Graham, O. H.--Paper on Field Observations in Mexico.

Eddy, G. W.--Paper on Screwworm Attractants.

Jones, C. M.--Paper on Sterility of Egg Masses Collected in South Texas.

(All presented at same meeting)

Crystal, M. M. Chemosterilization of screwworm flies: modification of action by temperature. Presented at Annual Meeting of the Entomological Society of America; Montreal, Canada. Dec. 1972.







12. Need for and Use of Additional Funds:

- a. ARS Special Fund. Under Item 9, we have listed only regular funds of \$252,000 although in 1973 we had an additional \$75,000 of special funds. It is essential that we continue to receive a minimum of \$75,000 additional support in FY 1974 in order to fulfill our commitment for field research in Mexico. In April 1974, a Mexican screwworm eradication program (80% funded by the US) is scheduled to start with the production of sterile flies at the rate of 300 million per week from a new plant to be constructed at Tuxtla Gutierrez, Chiapas, Mexico. The fly breeding colony is to be from a new stock furnished by ARS. This stock is to be genetically compatible with screwworms in southern and western Mexico where the sterile flies must compete for mates. Unless we have a budget of at least \$75,000 to supplement the regular funds, we cannot support the field work in Mexico necessary to develop that one new strain of flies needed as a minimum colony to start the Mexican production.
- b. ARS Extramural Funds: Field work shows the need for additional specialized strains to compete in unique ecological situations in isolated areas of Mexico. We need to collect egg masses from a minimum of 18 different areas in southern and western Mexico and by a special breeding program establish colonies of those 18 strains and cross breed them so that all 18 blood lines are incorporated into one new Mexican strain. This strain has to be tested for mating competitiveness in the field against local wild flies in a variety of ecological and geographical situations. We may have difficulty in adapting strains so that they can thrive in laboratory culture. Strains may fail in field trials and still newer strains will be needed. It is ARS's responsibility to furnish APHIS with colonies of new strains of competitive flies whenever new breeding stocks are needed in the Eradication Program. To be adequately budgeted for this, an additional \$50,000 is urgently needed to cover emergency field travel in Mexico and expansion of existing cooperative agreements with Mexican scientific institutions.







HO 202. Screwworm Biology and Control, 0410.

13. FY 1974 Project Plan Budget Estimate:

- a. Location: Mission, Texas  
Complete WRU Number: 301-7204-11990

b. Personal Services and Benefits:

- (1) Regular Salaries and Benefits  
(2) L/A & WAE employment (Total hours )  
(3) Overtime, Holiday Pay, Differentials,  
and Awards

Subtotal Personal Services and Benefits

- (4) Attach WRU Salary Detail

c. Support Services:

- (1) Travel and Per Diem  
(2) Transportation of things  
(3) Rent, Communication, and Utilities  
(4) Other Services including Reproduction  
(5) Broad Form Cooperative Agreements  
(6) Supplies and Materials  
(7) Construction and Repairs  
(8) Miscellaneous

Subtotal Support Services

d. Support Equipment

- e. Extramural Support - Research Contracts,  
Grants, and General and Specific Cooperative  
Agreements. Funded by base funds

f. Estimated Value of Services and Facilities  
Furnished by Cooperators or Grantors in  
Support of Your Research:

| Estimated Costs |                         |
|-----------------|-------------------------|
| <u>FY 1973</u>  | <u>: FY 1974</u>        |
|                 | :                       |
| 194,400         | : 202,000               |
|                 | :                       |
|                 | :                       |
|                 | :                       |
|                 | :                       |
| 194,400         | : 202,000               |
|                 | :                       |
|                 | :                       |
|                 | :                       |
| 21,100          | : 20,000                |
|                 | :                       |
| 100             | :                       |
|                 | :                       |
| 981             | : 1,000                 |
|                 | :                       |
| 725             | : 500                   |
|                 | :                       |
| 63,000          | :                       |
|                 | :                       |
| 37,684          | : 23,000                |
|                 | :                       |
| 660             | : 500                   |
|                 | :                       |
| 8,250           | : 5,000 <sup>2/</sup>   |
|                 | :                       |
| 132,528         | : 50,000                |
|                 | :                       |
| 18,400          | :                       |
|                 | :                       |
|                 | :                       |
|                 | :                       |
| \$345,300       | <sup>1/</sup> \$252,000 |
|                 | :                       |
|                 | :                       |
|                 | :                       |

1/ Includes \$75,000 ARS Contingency Funds and \$30,000 ARS Extramural Funds.

2/ Deputy Reserve.







Screwworm Biology and Control  
Mission, Texas  
301-7204-11990

WRU SALARY DETAIL  
(7204)

Type of Fund 401  
WRU No. 11990

| <u>Name</u>                 | <u>Title</u>       | <u>Grade-<br/>Step</u> | <u>Status</u> | <u>MY of time<br/>on this WRU</u> | <u>Cost of Per.<br/>Service &amp; Ben.</u> |
|-----------------------------|--------------------|------------------------|---------------|-----------------------------------|--------------------------------------------|
| Bushland, R. C.             | Res. Ent.<br>(Med) | GS-1606                | PFT           | 1.0                               | \$37,392                                   |
| Eddy, G. W.                 | Res. Ent.          | GS-1507                | PFT           | 0<br>(Retires 5/12/73)            | - 34,922                                   |
| Hightower, B. G.            | Res. Ent.          | GS-1404                | PFT           | 1.0                               | 27,480                                     |
| Crystal, M. M.              | Res. Ent.          | GS-1403                | PFT           | 1.0                               | 24,507                                     |
| Jones, C. M.                | Res. Ent.          | GS-1305                | PFT           | 1.0                               | 22,935                                     |
| Grabbe, R. R.               | Res. Chem.         | GS-1202                | PFT           | 1.0                               | 19,217                                     |
| Turner, J. P.               | Bio Tech           | GS-705                 | PFT           | 1.0                               | 11,081                                     |
| Lopez, E.                   | Bio Tech Ins       | GS-704                 | PFT           | 1.0                               | 10,755                                     |
| Gonzalez, <del>F</del> . C. | Agri Res<br>Tech   | GS-702                 | PFT           | 1.0                               | 10,103                                     |
| Handke, B. D.               | Bio Tech           | GS-506                 | PFT           | 1.0                               | 9,222                                      |
| Garcia, J. J.               | Bio Tech           | GS-501                 | PFT           | 1.0                               | 7,904                                      |
| Ramirez, R.                 | Bio Aid            | GS-402                 | PPT           | 1.0                               | 6,570                                      |
| Jester, T. V.               | Clerk-Typist       | GS-402                 | PPT           | 1.0                               | 7,927                                      |
| Bazan, H.                   | Ins Res Hlpr       | WG-302                 | TFT           | 1.0                               | <u>6,873</u>                               |
|                             |                    |                        |               |                                   | 236,888                                    |







a proposal to E. A. Taylor

July 12, 1973

Program for ARS production of breeding stocks to be supplied daily to APHIS

1. Have 3 genetically distinct breeding stocks each developed from 20 or more field collected egg masses.
2. To maintain genetic purity of strains each (designated A, B and C) reared separately as shown on building sketch.
3. For breeding stocks to produce 200 million flies weekly APHIS now eggs 3 million. We will give APHIS 1 million eggs per day - 333,000 each of strains, A, B & C. APHIS will rear these eggs to adult and stock rearing cages with equal mixture of A, B & C pupae 10,000-12,000 of each strain. At random mating eggs from these cages will be  $\frac{1}{9}$  pure A,  $\frac{1}{9}$  pure B,  $\frac{1}{9}$  pure C and  $\frac{2}{3}$  will be AB, AC or BC with hybrid vigor.
4. To produce ARS eggs we will start stocks each day for strain A (similarly for B & C). 15,000 pupae in standard colony cage. Eggs when 8 days old, 7,000 ♀s should survive, if only half oviposit, 3500 @ 200 eggs each lay 700,000 eggs. - (quota is 333,000). If this margin of safety is inadequate we can increase cage stock to as high as 35,000 flies.







## Fly Breeding Program, Continued.

5. production facilities should easily be adequate to produce 2 million flies of each strain per week extra capacity for field tests
6. A fourth rearing area equivalent to those for the 3 production strains will be used to develop new colonies and to test new procedures. There will be built up reserve strains to be field tested as candidate replacements for production strains. It is anticipated that each production strain will be replaced by a newer strain within 2 years to maintain breeding stocks as nearly wild-type as possible
7. Isozyme studies will be used to monitor each generation of production stocks. Isozyme surveys will be indexes of genetic variability of field collections





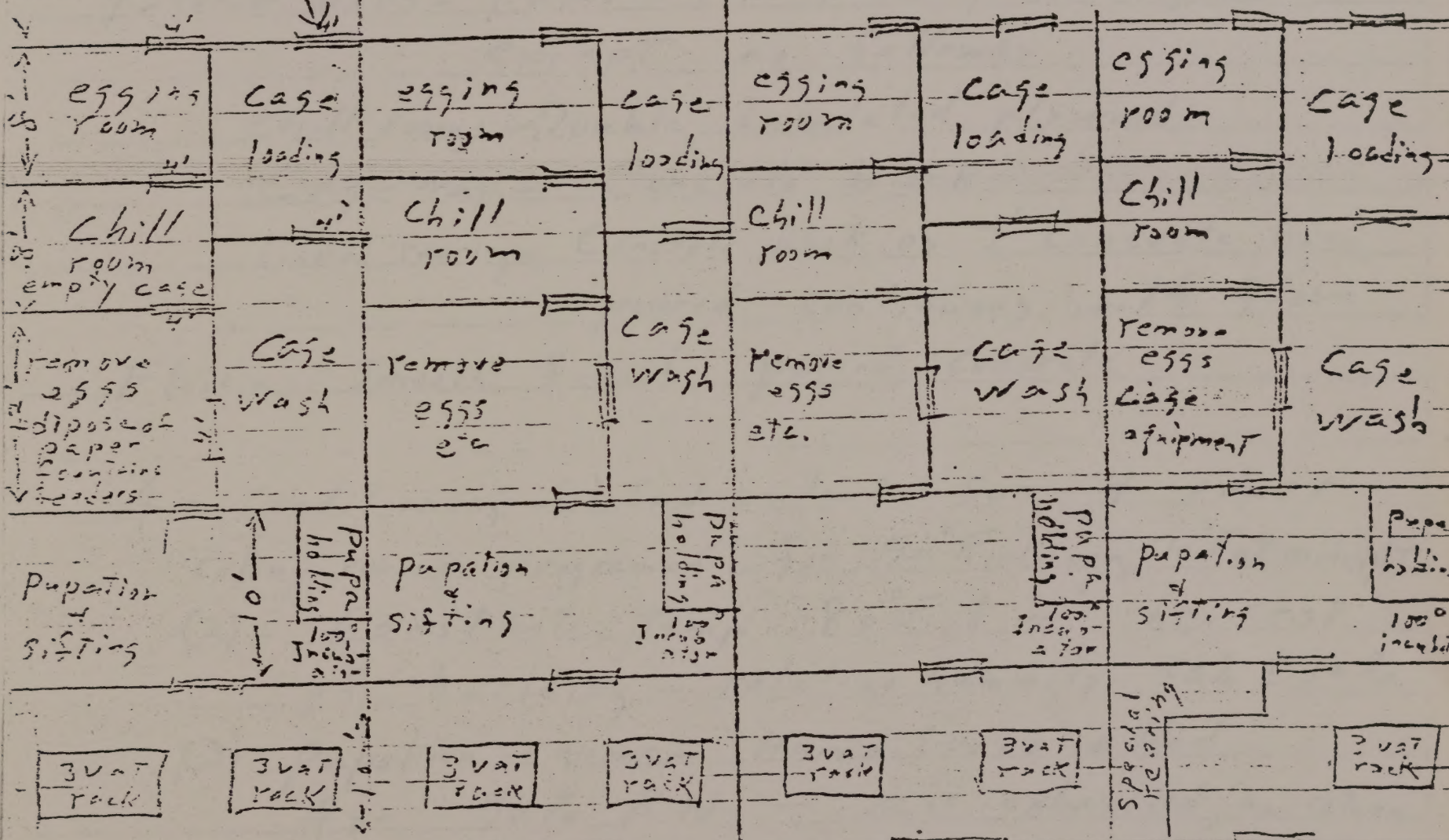


60 x 60

A Colony 20'      B Colony 20'      C Colony 20'      New strain Colonization

10 colony cages      10 colony cages      10 colony cages      Adult room  
various kinds of cages

3' x 5' Sliding Door



Service area

Medic preparation, cleaning + sterilizing  
Incubation of eggs + pupae  
Spent media disposal

Entrance to Main Laboratory

July 12, 1973  
R.C. Bushland  
A.J. Graham

4' Door







# 80' x 88' Rearing Building Specifications

Foundation - reinforced concrete slab

Exterior walls - plywood on 16" center 2x4 studs  
insulated with spray-on polyurethane

Roof - plywood insulated with polyurethane

Interior walls - Painted (waterproof) plywood, ~~5~~  
except as follows:

Chill rooms - Double, Insulated plywood

Cage wash - Concrete block

Larva rearing - Concrete block on 2' concrete base  
poured continuous with floor.

Floor - Smooth finish poured concrete

Air Conditioning - (1) Independent for 4 adult  
colony rooms programmed for 90°F at noon, 70°F at midnight.

(2) - Constant Temp. 80°F  $\pm$  2° in rest  
of building - relative humidity 50%  $\pm$  10%

(3) pupation rooms - Humidifiers added  
for 90% R.H. - air exhausted, no return

(4) Larva rearing rooms - air exhausted, no return

Lighting - Day-length programmed with dimmer  
switches for adult colony and larva rearing.  
Red lights for night periods.







## New equipment for breeding colonies

|                            |                             |        |
|----------------------------|-----------------------------|--------|
| Colony cages (APHIS spec.) | 36 @ 530 <sup>¢</sup> ea. - | 19,080 |
| Rearing vats (APHIS spec.) | 21 @ 130 <sup>¢</sup> ea. - | 2,730  |
| Vat racks (APHIS spec.)    | 7 @ 150 <sup>¢</sup> ea. -  | 1,050  |
| Bacteriological incubators | 4 @ 300 <sup>¢</sup> ea.    | 1,200  |
| Rearing vats (1/4 size)    | 12 @ 75 <sup>¢</sup> ea.    | 900    |
| pupa holding trays         | 48 @ 10 <sup>¢</sup> ea.    | 480    |
| Larva capture pans         | 56 @ 10 <sup>¢</sup> ea.    | 560    |
| Media mixers               | 4 @ 300 <sup>¢</sup> ea. -  | 1,200  |
| Refrigerators              | 4 @ 250 <sup>¢</sup> ea. -  | 1,000  |
| Total                      |                             | 28,200 |

## New equipment for physiology research

|                      |                           |      |
|----------------------|---------------------------|------|
| Bioclimatic cabinets | 2 @ 1700 <sup>¢</sup> ea. | 3400 |
| Total                |                           | 3400 |

## Miscellaneous rearing equipment

|                       |                           |       |
|-----------------------|---------------------------|-------|
| Small cages           | 100 @ 10 <sup>¢</sup> ea. | 1,000 |
| Larva sifters         | 4 @ 75 <sup>¢</sup> ea.   | 300   |
| Larva-pupa separators | 4 @ 100 <sup>¢</sup> ea.  | 400   |
|                       |                           | 1,700 |

Grand total equipment 33,300

New 80 x 80 Building for Breeding Stocks  
(Estimates by Joe Smiley for APHIS force construction)

|                                        |        |
|----------------------------------------|--------|
| Building shell -                       | 50,000 |
| Electrical, air-conditioning, plumbing | 25,000 |
| Total                                  | 75,000 |







1 page 6  
New salary expense - Expanded research

|                               |                           |        |
|-------------------------------|---------------------------|--------|
| 2 - Entomologists             | GS-12 - (Mexico, field)   | 34,000 |
| 1 - Entomologist              | GS-12 (Laboratory)        | 17,000 |
| 1 - <del>Bio</del> Biochemist | GS-12 (Isozyme studies)   | 17,000 |
| 1 - Technician                | GS-7 (Laboratory rearing) | 9,500  |
| 3 - Technicians               | GS-5 ( " " )              | 23,400 |
| 3 - Technicians               | GS-3 ( " " )              | 18,500 |
| 3 - Technicians               | GS-1 (Fly sorting)        | 15,000 |
| 1 - Laborer                   | WB-2 (Laboratory janitor) | 5,000  |
| 1 - Clerk                     | GS-3 (Office)             | 6,200  |

16

Total.

145,600







7g. eggs or 140,000 per APHIS vat

? yield - 100,000 pupae -

10 vats per 1 million

30 vats for 3 million flies

← house meat - 6g ←

$$30 \times 6 = \frac{180g \text{ eggs needed weekly}}{20}$$

3600,000

100,000 flies in colony to supply eggs  
for above

→ 20 Kerrille cages?

a more conservative calculation based on  
50 eggs per ♀ indicates a requirement  
to egg 144,000 flies per week

or 30 Kerrille cages  $\times$  5,000 flies =  
150,000 fly adults  
in ARS colony



17 eggs in 140,000 per APH12 not

7 yield - 100,000 per day

10 not per 1 million  
30 not per 3 million  
fluo

11  
→ lower cost - 10

30 x 6 = 180 eggs needed weekly  
200,000

100,000 fluo in colony to supply eggs  
for about

20 female cages?

to more conservative calculation based on  
20 eggs per ♀ indicates a requirement  
to egg 100,000 fluo per week

or 30 female cages x 2,000 fluo =

120,000 fluo

in AGS colony



Field test

$$40 \times 50 \text{ sq. mi} \approx 2,000 \text{ sq. mi.}$$

$$\frac{1000 \text{ flies/sq mi/wh}}{\text{or approx.}} = \frac{2,000,000 \text{ flies per week}}{325,000 \text{ pupae/day}}$$

? 5 rats per day

5-6



field that

no x 20 of our = 3'000 ad. m.

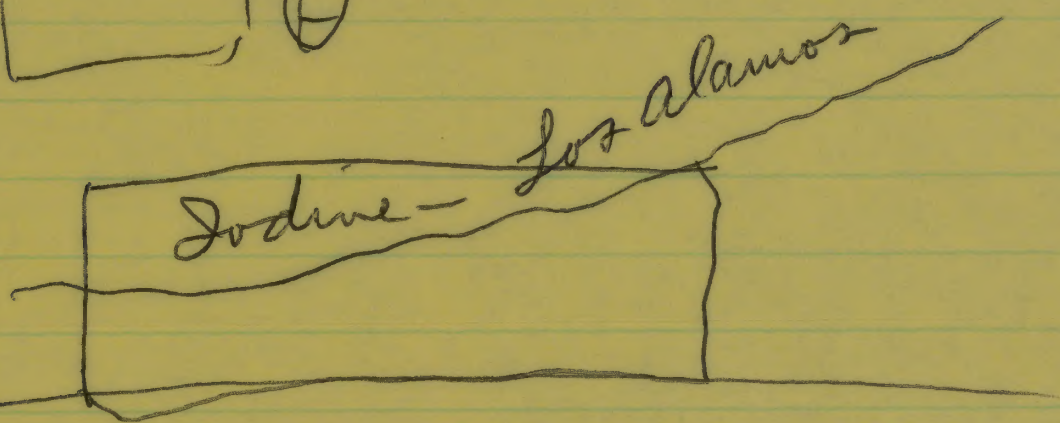
1000 ft<sup>2</sup> / ad m / day = 2,000,000 ft<sup>2</sup> / day  
or equivalent 322,000 ft<sup>2</sup> / day

5 2 votes per day



RL meetings (10:00 AM Friday)

mel - cage size =  $\frac{1}{4}$



a. horse meat vs nutria

For Kv. cage, load 4 cages <sup>each day</sup> with 1.5 liters of pupae (old rate) or 0.75 liters for current loading rates -

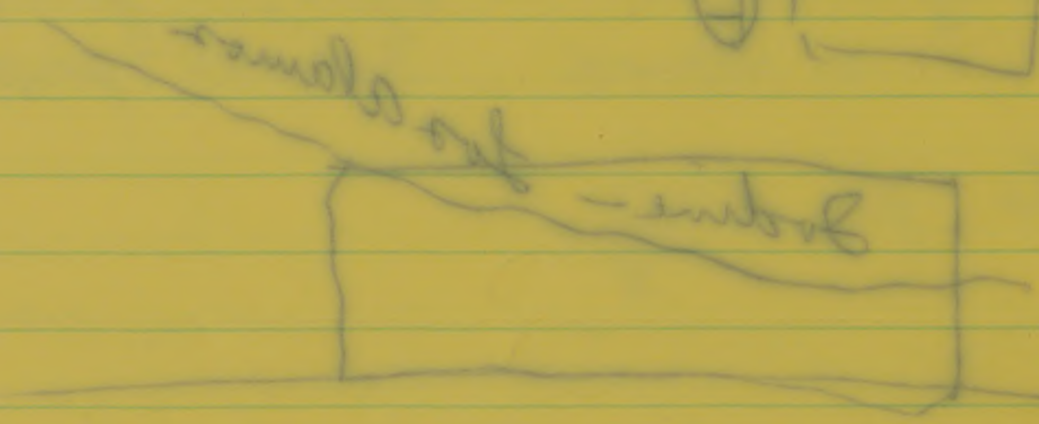
0.75 X 6 cages = 45,000 pupae  
or 40,000 flies

at 50 eggs per ♀, 20,000 flies would produce 1,000,000 or 50g of eggs -



MA 23:01  
Friday

egg size - 1/4  
egg size - 1/4



horse meat 100 units

For the eggs, load a cage with 1.2 liter of pupae (old rats) on 0.75 liter for current breeding water -

0.75 x 6 eggs = 4.5,000 pupae on 40,000 flies

at 20 eggs per ♀, 80,000 flies would produce 1,600,000 or 200 of eggs -



U.S. DEPARTMENT OF AGRICULTURE

DATE

REFERENCE SLIP

*File*  
*7/13/73*

TO

*Taylor*  
*Knippling*  
*Klassen*  
*Henderson*

☐ ACTION

☐ NOTE AND RETURN

☐ APPROVAL

☐ PER PHONE CALL

☐ AS REQUESTED

☐ RECOMMENDATION

☐ FOR COMMENT

☐ REPLY FOR SIGNATURE OF

☐ FOR INFORMATION

☐ RETURNED

☐ INITIALS

☐ SEE ME

☐ NOTE AND FILE

☐ YOUR SIGNATURE

REMARKS

*This attachment*  
*was delivered to Taylor*  
*7/13. Copies mailed*  
*to Knippling, Klassen*  
*& Henderson.*

*Keep in Reference File*  
*will need it often*

FROM

*R C B.*







*Circulate*

U.S. DEPARTMENT OF AGRICULTURE

DATE

REFERENCE SLIP

*7/13/73*

TO

*Hightower ✓*

*Jones ✓*

*Crystal ✓*

*Grabbe ✓*

☐ ACTION

☒ NOTE AND RETURN

☐ APPROVAL

☐ PER PHONE CALL

☐ AS REQUESTED

☐ RECOMMENDATION

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☐ REPLY FOR SIGNATURE OF

☒ FOR INFORMATION

☐ RETURNED

☐ INITIALS

☐ SEE ME

☐ NOTE AND FILE

☐ YOUR SIGNATURE

REMARKS

*This was prepared in response to Mr. Taylor's request that I prepare a supplemental budget request.*

*Please pass on. If he made any more more please advise.*

FROM

*RCB*







First draft of  
a proposal to E. A. Taylor

July 12, 1973

Program for ARS production of breeding stocks to be supplied daily to APHIS

1. Have 3 genetically distinct breeding stocks each developed from 20 or more field collected egg masses.
2. To maintain genetic purity of strains each (designated A, B and C) reared separately as shown on building sketch.
3. For breeding stocks to produce 200 million flies weekly APHIS now eggs 3 million.  
We will give APHIS 1 million eggs per day — 333,000 each of strains, A, B & C.  
APHIS will rear these eggs to adult and stock rearing cages with equal mixture of A, B & C pupae 10,000-12,000 of each strain.  
At random mating eggs from these cages will be  $\frac{1}{9}$  pure A,  $\frac{1}{9}$  pure B,  $\frac{1}{9}$  pure C and  $\frac{2}{3}$  will be AB, AC or BC with hybrid vigor.
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15,000 pupae in standard colony cage.  
Eggs when 8 days old,  
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3500 @ 200 eggs each lay 700,000 eggs. — (quota is 333,000)  
If this margin of safety is inadequate we can increase cage stock to as high as 35,000 flies.







## Fly Breeding Program, Continued -

5. production facilities should easily be adequate to produce 2 million flies of each strain per week extra capacity for field tests
6. A fourth rearing area equivalent to those for the 3 production strains will be used to develop new colonies and to test new procedures. There will be built up reserve strains to be field tested as candidate replacements for production strains. It is anticipated that each production strain will be replaced by a newer strain within 2 years to maintain breeding stocks as nearly wild-type as possible.
7. Isozyme studies will be used to monitor each generation of production stocks. Isozyme surveys will be indexes of genetic variability of field collections.







80 x 85'

A Colony  
20'

B Colony  
20'

C Colony  
20'

New strain  
Colonization

10  
Colony  
cages

10 colony  
cages

10 colony  
cages

Adult  
room  
various  
kinds of  
cages

3'x6'

Sliding  
Door

egging  
room

Cage  
loading

egging  
room

Cage  
loading

egging  
room

Cage  
loading

egging  
room

Cage  
loading

Chill  
room  
empty cage

Chill  
room

Chill  
room

Chill  
room

remove  
eggs  
dispose of  
paper  
containers  
wash

Cage  
wash

remove  
eggs  
etc.

Cage  
wash

remove  
eggs  
etc.

Cage  
wash

remove  
eggs  
Cage  
equipment

Cage  
wash

Pupation  
&  
sifting

Pupa  
holding  
1000  
incubator

pupation  
&  
sifting

Pupa  
holding  
1000  
incubator

Pupa  
holding  
1000  
incubator

pupation  
&  
sifting

Pupa  
holding  
1000  
incubator

3 vat  
rack

3 vat  
rack

3 vat  
rack

3 vat  
rack

3 vat  
rack

3 vat  
rack

Special  
breeding  
1000  
incubator

3 vat  
rack

Service area

Medic preparation cleaning + sterilizing  
Incubation of eggs + paper  
Spent media

Storage

Entrance to  
Main Laboratory

July 12, 1973  
R.C. Bushland  
A.J. Graham

4' Door







## 8' x 8' Rearing Building Specifications

Foundation - reinforced concrete slab

Exterior walls - plywood on 16" center 2x4 studs  
insulated with spray-on polyurethane

Roof - Plywood insulated with polyurethane

Interior walls - Painted (waterproof) plywood, ~~S~~  
except as follows:

Chill rooms - Double, Insulated plywood

Cage wash - Concrete block

Larva rearing - Concrete block on 2' concrete base  
poured continuous with floor.

Floor - Smooth finish poured concrete

Air Conditioning - (1) Independent for 4 adult  
colony rooms programmed for 90°F at noon, 70°F at midnight.

(2) - Constant temp. 80°F  $\pm$  2° in rest  
of building - relative humidity 50%  $\pm$  10%

(3) pupation rooms - Humidifiers added  
for 90% R.H. - air exhausted, no return

(4) Larva rearing rooms - air exhausted, no return

Lighting - Day-length programmed with dimmer  
switches for adult colony and larva rearing.  
Red lights for night periods.







## New equipment for breeding colonies

|                                    |              |        |
|------------------------------------|--------------|--------|
| Colony cages (APHIS spec.)         | 36 @ 530 ea. | 19,080 |
| Rearing vats (APHIS spec.)         | 21 @ 130 ea. | 2,730  |
| Vat racks (APHIS spec.)            | 7 @ 150 ea.  | 1,050  |
| Bacteriological incubators         | 4 @ 300 ea.  | 1,200  |
| Rearing vats ( $\frac{1}{4}$ size) | 12 @ 75 ea.  | 900    |
| pupa holding trays                 | 48 @ 10 ea.  | 480    |
| Larva capture pans                 | 56 @ 10 ea.  | 560    |
| Media mixers                       | 4 @ 300 ea.  | 1,200  |
| Refrigerators                      | 4 @ 250 ea.  | 1,000  |
| Total                              |              | 28,200 |

## New equipment for physiology research

|                       |              |      |
|-----------------------|--------------|------|
| Bio climatic cabinets | 2 @ 1700 ea. | 3400 |
| Total                 |              | 3400 |

## Miscellaneous rearing equipment

|                       |              |       |
|-----------------------|--------------|-------|
| Small cages           | 100 @ 10 ea. | 1,000 |
| Larva sifters         | 4 @ 75 ea.   | 300   |
| Larva-pupa separators | 4 @ 100 ea.  | 400   |
|                       |              | 1,700 |

Grand total equipment 33,300

## New 80 x 80 Building for Breeding Stocks

(Estimates by Joe Smythey for APHIS force construction)

|                                        |        |
|----------------------------------------|--------|
| Building shell                         | 50,000 |
| Electrical, air-conditioning, plumbing | 25,000 |
| Total                                  | 75,000 |







## New salary expense - Expanded research

|                               |                           |        |
|-------------------------------|---------------------------|--------|
| 2 - Entomologists             | GS-12 - (Mexico, field)   | 34,000 |
| 1 - Entomologist              | GS-12 (Laboratory)        | 17,000 |
| 1 - <del>Bio</del> Biochemist | GS-12 (Isozyme studies)   | 17,000 |
| 1 - Technician                | GS-7 (Laboratory rearing) | 9,500  |
| 3 - Technicians               | GS-5 ( " " )              | 23,400 |
| 3 - Technicians               | GS-3 ( " " )              | 18,500 |
| 2 - Technicians               | GS-1 (Fly sorting)        | 15,000 |
| 1 - Laborer                   | WB-2 (Laboratory janitor) | 5,000  |
| 1 - Clerk                     | GS-3 (Office)             | 6,200  |

---

|    |        |         |
|----|--------|---------|
| 16 | Total. | 145,600 |
|----|--------|---------|







# Travel estimates - field research

## Present Staff

Hightower

100 days @ \$22 2200

Car expense @ \$10 per day 1000

Jones

150 days @ \$22 3300

Car expense @ \$10 per day 1500

Gonzales

150 days @ \$22 3300

Car expense @ \$10 per day 1500

Lopez

150 days @ \$22 3300

Car expense @ \$10 per day 1500

Bushland

50 days @ 22 1100

Car expense 25 days @ 10 250

Air travel 4 trips Washington,

Normansville, Tohlimingo, etc. 1000

Total 19,950







Travel estimates - field research (CONT.)

New staff

GS-12 entomologist - Southern Mexico

150 days @ \$22 3300

cor 150 days @ \$10 1500

GS-12 entomologist - Northern Mexico

150 days @ \$22 3300

cor expense 150 @ \$10 1500

Southern Mexico entomologist to work with INIA studying screwworm biology, doing field tests of new strains and collecting egg masses for genetic studies and possible laboratory colonization.

Northern Mexico entomologist to do similar work in cooperation with Monterrey Tech.

Total Field Travel New Staff 9,600







## Additional Budget Needs Mission

### ARS Production of Breeding Stocks -

|                                      |   |                |
|--------------------------------------|---|----------------|
| New Breeding                         | - | 75,000         |
| New Equipment                        | - | 33,300         |
| Salaries New Production Staff        | - | <u>111,600</u> |
| Total, Production of breeding stocks |   | 219,900        |

### Expanded Mexico Field Studies

|                              |   |               |
|------------------------------|---|---------------|
| Salary 2 AS 12 Entomologists | - | 34,000        |
| Travel Costs 2 new men       |   | 9,600         |
| Travel Costs present staff   |   | <u>20,000</u> |
| Total - Mexico Field studies |   | <u>63,600</u> |

|                              |  |                       |
|------------------------------|--|-----------------------|
| <u>Total Budget Increase</u> |  | <u><u>282,500</u></u> |
|------------------------------|--|-----------------------|

The budget does not reflect the costs of food for larvae & adults or the cost of utilities required for rearing flies.







OF UNITED STATES  
DEPARTMENT OF  
AGRICULTUREU.S. LIVESTOCK INSECTS LABORATORY  
P.O. BOX 232  
KERRVILLE, TEXAS 78028

June 6, 1979

Hop -

Enclosed is a copy of the only copy I have of Bushland's A, B, C. plan for a constant input of wild genes into the APHIS production scheme. You will note it is in Bushland's handwriting as he had no secretary at the time. Taylor or Snow should have typewritten versions that may be a little more refined but the basic idea is clearly presented in this version.

While the idea of rearing an Aldama (or whatever other locality) strain for release in Aldama is worthy of testing, I suspect that when the test has been completed, no one will know whether or not the special strain was more effective than the Arizcruz or any other strain (which is just another way of saying exactly what you have been saying for 2 or 3 years).

Until the UT team, or someone else, can come up with solid evidence of cryptic species, or some other form







of specialization accompanying isolation. I will continue to believe that Bush's 1973 scheme is by far the most practical approach ~~to~~ yet devised for the constant production by APHIS of flies genetically suitable for distribution in all areas of Mexico and the United States.

Would like to know your reaction to all this. I have had no response from anyone in APHIS or SEA to my memo of May 7, 1979 to Norman Meyer - I feel the freeze too.

Hugh







SEA

AGRICULTURAL  
RESEARCH  
SERVICESOUTHERN  
REGIONOF UNITED STATES  
DEPARTMENT OF  
AGRICULTUREU.S. LIVESTOCK INSECTS LABORATORY  
P.O. BOX 232  
KERRVILLE, TEXAS 78028

June 6, 1979

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Would like to know your  
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to my memo of May 7, 1979 to Norman  
Meyer - I feel the freeze too.

Hugh





Screwworm Research Laboratory  
P. O. Box 986  
Mission, Texas 78572

July 27, 1973

Subject: Budget for FY 74

To: H. C. Cox  
Associate Deputy Administrator  
USDA, ARS, Southern Region  
New Orleans, Louisiana 70153

In response to your request over the telephone on July 25, I am attaching a longhand draft defending our request for a budget increase.

This is to supplement the material Mr. Taylor sent you via telecopier on July 16.

I hope that I have followed your instructions well enough for you to combine the new material with Mr. Taylor's proposal.

R. C. Bushland  
Research Leader

cc: E. A. Taylor

Enclosure





U.S. DEPARTMENT OF AGRICULTURE

DATE

REFERENCE SLIP

TO

*Dr. Bushland*

*17 JUL 1973*

☐ ACTION

☐ NOTE AND RETURN

☐ APPROVAL

☐ PER PHONE CALL

☐ AS REQUESTED

☐ RECOMMENDATION

☐ FOR COMMENT

☐ REPLY FOR SIGNATURE OF

☒ FOR INFORMATION

☐ RETURNED

☐ INITIALS

☐ SEE ME

☐ NOTE AND FILE

☐ YOUR SIGNATURE

REMARKS

*This is the  
proposed budget  
worked up by Mr.  
Taylon from your  
figures. This informa-  
tion went out via  
teletypewriter today, as  
indicated on your copy  
attached.*

FROM

*Juanita Escamilla  
Area Office*





17 JUL 1973

B

A. W. Cooper  
E. F. Knipling  
W. Klassen  
L. S. Henderson  
(via telecopier)  
Juanita

FOR OFFICIAL USE ONLY  
United States Department of Agriculture  
Agricultural Research Service

### Description of Event

Field data indicate sterile screwworm flies released in eradication program have low mating competitiveness and are essentially ineffective in eradicating screwworms or at least maintaining fly populations below economic levels.

### Anticipated Timing

New application research programs should be implemented ASAP, not later than October, with detail research program review in August or September 1973.

### Background

The APHIS screwworm eradication program in the Southwest was not effective in 1972. The program in Arizona is currently in a critical situation. The number of cases that have occurred through June in Arizona exceeds by far the number that occurred by this time in 1972 or in previous years since the program was fully implemented in 1963. Field data from Mexico during the spring of 1973 indicated that massive over-flooding of wild fly population with sterile flies failed to reduce fertility of egg masses below 50%. Preliminary isoenzyme analyses of APHIS mass production stock have indicated a great loss of genetic variability (heterozygosity). Genetic deterioration of laboratory and plant production stocks has affected the quality of released flies as measured by mating competitiveness under field conditions but not the quantity (current plant production exceeds 200 million flies per week).

### Source of Interest

The failure of the eradication program in 1972-73 is a matter of concern and alarm to the entire livestock industry. This is of high interest to U. S. Senators and Representatives from the Southwestern States and the Joint U.S.-Mexico Screwworm Eradication Commission.

### Proposed Action

Complete review of current research findings and evaluation of a proposed screwworm application research program that will provide sexually aggressive flies for plant production and fully support the expanded eradication program in Mexico.







### Anticipated Consequences

ARS assume the responsibility for the maintenance and production of at least three separate fly strains (brood flies) which would provide eggs for APHIS plant production of release flies. Expand ARS application research program in order that adequate ecological and fly population information will be available in Mexico to support the Joint U.S.-Mexico Eradication Program and expand attractant field studies in the United States and Mexico. Expanded APHIS Eradication Program budget \$16 - \$19 million; ARS current program \$252,000. (See proposed new budget.)

### Contacts for Additional Information

|                 |                |                    |
|-----------------|----------------|--------------------|
| E. F. Knipling  | Beltsville, MD | PH. (301) 344-3245 |
| W. Klassen      | Beltsville, MD | PH. (301) 344-3918 |
| L. S. Henderson | Beltsville, MD | PH. (301) 344-3924 |
| R. C. Bushland  | Mission, TX    | PH. (512) 585-2783 |
| E. A. Taylor    | Weslaco, TX    | PH. (512) 968-5913 |

Date Submitted July 16, 1973

|                   |     |           |
|-------------------|-----|-----------|
| Priority Category | I   | Definite  |
| Category          | II  | Immediate |
| Category          | III | ARS       |





PROPOSAL FOR EXPANDED ARS APPLICATION  
SCREWORM RESEARCH PROGRAM

---

ARS production of breeding stocks to be supplied daily to APHIS:

1. Have 3 genetically distinct breeding stocks each developed from 20 or more field collected egg masses.
  2. To maintain genetic purity of strains each (designated A, B, and C) reared separately as shown on building sketch.
  3. For breeding stocks to produce 200 million flies weekly, APHIS now eggs 3 million. We will give APHIS 1 million eggs per day--333,000 each of strains A, B, and C. APHIS will rear these eggs to adult and stock rearing cages with equal mixture of A, B, and C pupae--10,000 - 12,000 of each strain. At random mating eggs from these cages will be 1/9 pure A, 1/9 pure B, 1/9 pure C and 2/3 will be AB, AC or BC with hybrid vigor.
  4. To produce ARS eggs we will start stocks each day for strain A (similarly for B and C):
    - 15,000 pupae in standard colony cage
    - Egg when 8 days old;
    - 7,000 females should survive, if only half oviposit;
    - 3500 @ 200 eggs each lay 700,000 eggs. (Quota is 333,000)
- If this margin of safety is inadequate we can increase cage stocks to as high as 35,000 flies.
5. Production facilities should easily be adequate to produce 2 million flies of each strain per week extra capacity for field tests.
  6. A fourth rearing area equivalent to those for the 3 production strains will be used to develop new colonies and to test new procedures. There will be built up reserve strains to be field tested as candidate replacements for production strains. It is anticipated that each production strain will be replaced by a newer strain within 2 years to maintain breeding stocks as nearly wild-type as possible.
  7. Isozyme studies will be used to monitor each generation of production stocks. Isozyme surveys will be indexes of genetic variability of field collections.







## New Building and Equipment for Screwworm Breeding Colonies:

New 80 x 80 building for breeding stocks:

(Estimates by Joe Smithey for APHIS force construction)

|                                              |           |
|----------------------------------------------|-----------|
| Building shell -----                         | \$ 50,000 |
| Electrical, air-conditioning, plumbing ----- | \$ 25,000 |
| Total -----                                  | \$ 75,000 |

### Equipment:

|                             |                |       |           |
|-----------------------------|----------------|-------|-----------|
| Colony cages (APHIS specs.) | 36 @ \$530 ea. | ----- | \$ 19,080 |
| Rearing vats (APHIS spec.)  | 21 @ \$130 ea. | ----- | \$ 2,730  |
| Vat racks (APHIS spec.)     | 7 @ \$150 ea.  | ----- | \$ 1,050  |
| Bacteriological incubators  | 4 @ \$300 ea.  | ----- | \$ 1,200  |
| Rearing vats (1/4 size)     | 12 @ \$ 75 ea. | ----- | \$ 900    |
| Pupa holding trays          | 48 @ \$ 10 ea. | ----- | \$ 480    |
| Larva capture pans          | 56 @ \$10 ea.  | ----- | \$ 560    |
| Media mixers                | 4 @ \$300 ea.  | ----- | \$ 1,200  |
| Refrigerators               | 4 @ \$250 ea.  | ----- | \$ 1,000  |
| Total -----                 |                |       | \$ 28,200 |

### Equipment for physiology research:

|                      |                |       |          |
|----------------------|----------------|-------|----------|
| Bioclimatic cabinets | 2 @ \$1700 ea. | ----- | \$ 3,400 |
|----------------------|----------------|-------|----------|

### Miscellaneous rearing equipment:

|                       |                |       |          |
|-----------------------|----------------|-------|----------|
| Small cages           | 100 @ \$10 ea. | ----- | \$ 1,000 |
| Larva sifters         | 4 @ \$75 ea.   | ----- | \$ 300   |
| Larva-pupa separators | 4 @ \$100 ea.  | ----- | \$ 400   |
| Total -----           |                |       | \$ 1,700 |

|                   |           |
|-------------------|-----------|
| GRAND TOTAL ----- | \$108,300 |
|-------------------|-----------|





3.

New Positions for Expanded Application Research for Screwworm:

|                                                |           |
|------------------------------------------------|-----------|
| 2 Entomologists GS-12 (Mexico, field) -----    | \$ 34,000 |
| 1 Entomologist GS-12 (Physiology) -----        | \$ 17,000 |
| 1 Entomologist GS-12 (Laboratory Rearing)----- | \$ 17,000 |
| 1 Biochemist GS-12 (Isozyme studies) -----     | \$ 17,000 |
| 1 Technician GS-7 (Laboratory rearing) -----   | \$ 9,500  |
| 3 Technicians GS-5 (Laboratory rearing) -----  | \$ 23,400 |
| 3 Technicians GS-3 (Laboratory rearing) -----  | \$ 18,500 |
| 3 Technicians GS-1 (Fly sorting) -----         | \$ 15,000 |
| 1 Laborer WB-2 (Laboratory Janitor) -----      | \$ 5,000  |
| 1 Clerk GS-3 (Office) -----                    | \$ 6,200  |

---

|    |             |           |
|----|-------------|-----------|
| 17 | Total ----- | \$162,600 |
|----|-------------|-----------|

|                          |           |
|--------------------------|-----------|
| Travel and Support ----- | \$113,400 |
|--------------------------|-----------|

---

|             |           |
|-------------|-----------|
| Total ----- | \$275,000 |
|-------------|-----------|

|                                      |           |
|--------------------------------------|-----------|
| Rearing building and equipment ----- | \$108,300 |
| (APHIS contribution)                 |           |

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|                   |           |
|-------------------|-----------|
| GRAND TOTAL ----- | \$383,300 |
|-------------------|-----------|

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APHIS should supply food for larvae and adults and utilities for new building.

Date Submitted: July 16, 1973





UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
SOUTHERN REGION  
701 LOYOLA AVENUE  
P. O. BOX 53326  
NEW ORLEANS, LOUISIANA 70153

20 AUG 1973

*File*

*RCB*

August 17, 1973

Subject: Screwworm Research

To: T. W. Edminster, Administrator

As you know, the screwworm eradication program conducted by APHIS suffered a very serious setback last year in Texas and has been in difficulty this year in Arizona and New Mexico. During this period the U. S. signed an agreement with Mexico whereby the screwworm eradication program will be extended in Mexico down to the Isthmus of Tehuantepec. And, of course, Congress has increased the USDA/APHIS budget to provide for the extended operational program.

During the past few years we increased support for the screwworm research program by about 25 percent; however, this increase was rather modest considering the increased cost of operations during recent years. Regardless, the increase is not enabling us to keep pace and provide solutions to the problems being encountered by APHIS. Now that the operational program is moving into Mexico, there will undoubtedly be an increasing need for ARS research.

In anticipation of the increased need, our Sub-Tropical Texas Area gave screwworm first priority in their FY75 budget request, a proposed increase of 3 SMY. SR also placed screwworm first in priority in the beef cattle package request. We do not know if this important work became a part of the ARS FY75 budget proposal to the Department. Also, during the recent discussions to develop a \$1.1 million meat animal program for FY74, we gave screwworm a high priority rating. So far as we are able to determine, it was not included in the package finally developed. And yet, if not kept out of the U.S., screwworm will have a decidedly adverse impact on our livestock industry in the Southwest and South.

Even if our FY75 proposed increase is included in the budget, scientists at Mission are beginning to wonder if we can meet the demands







that APHIS may have for research. The attached statement, "Screw-worm Research", was prepared by those specialists in an effort to delineate the type of research program that will be necessary to provide solutions to the problems that will be encountered in Mexico and some that continue to occur in the U.S.

Since ARS research does support the operational program, we would be interested in learning the type and magnitude of problems that Dr. F. J. Mulhern and his top staff anticipate. We would greatly appreciate it if your office would discuss ARS projections with Dr. Mulhern in order to obtain his and your reactions to our concerns. The ARS Mission scientists are working closely with the APHIS Mission operational people, but we feel sure they would benefit by feedback from the top.

*A. W. Cooper*

A. W. Cooper  
Deputy Administrator

Enclosure





## SCREWWORM RESEARCH

The ARS Screwworm Research Laboratory at Mission, Texas, was established in FY 1963 with a budget of \$200,000. Its mission was, and still remains, research in support of the APHIS screwworm eradication program in the Southwest. For FY 1974, the tentative budget is \$256,500 to support 5 SMY. This budget has not permitted ARS research to keep pace with the APHIS screwworm eradication program that ARS is obligated to support. The APHIS screwworm eradication program started in 1963 with an annual budget of \$5 million. In FY 1973, the budget was \$9 million. With the Mexico operation included, the FY 1974 budget is approximately \$16 million. ARS responsibilities and fiscal needs to support the program have increased in the same proportion.

Eradication effort has been experiencing difficulties. Last year, there were 96,625 cases of screwworms identified in Texas on the basis of samples mailed to Mission program staff. There were, undoubtedly, many more unreported cases. This season, preceded by a cold winter, the situation is not so acute in Texas but Arizona and New Mexico are experiencing the worst screwworm year since the program started. Field tests made jointly with APHIS near Tampico and Victoria, Mexico, in the spring of 1973 showed that only 50% of the wild females mated with sterile males--even though trapping studies showed that sterile flies outnumbered wild flies more than 300 to 1. The continued increase of screwworm cases in Texas since the end of winter suggests that the released flies are not fully competitive. We do not know why.

Genetic research. There is a growing literature of insect genetics which reports that insects lose field adaptability through natural selection as they become adapted to laboratory colonization and mass rearing. Quite possibly, a loss of competitiveness among sterile screwworm flies is due to genetic deterioration in the laboratory. The new technique of isozyme analysis makes available biochemical markers to trace genetic changes in laboratory populations. Preliminary research indicates that ARS should initiate studies of biochemical variability in new field collections, and test each generation in the laboratory to assure that those field characteristics are maintained. Such research would require a full-time biochemist and support staff.

Mexico eradication program will add new problems. In November 1974, a new rearing plant is scheduled for completion at Tuxtla, Gutierrez, in the Isthmus of Tehuantepec. This plant is to produce 300 million sterile flies weekly to compete for mates against the wild population of southern Mexico. There is zero research knowledge regarding specifics on genetics, ecology, mating behavior, population density, etc., for this area. ARS has done no research south of the state of Vera Cruz and neither has anyone else. We have very little knowledge of screwworms along







the whole Pacific Coast of Mexico. The difficulties that APHIS has encountered in the screwworm eradication effort in Puerto Rico have highlighted our lack of knowledge about screwworm in tropical areas.

Ecological research. We need many field samples of screwworms from southern Mexico and the Pacific coast for genetic comparison. It is essential that the flies to be sterilized and released in those new areas of Mexico match the heredity of the populations in which they will compete for mates. At the earliest possible date, field samples of new insect stocks should be collected from varied ecological situations. In addition, strains of sterilized flies should be field tested for mating competitiveness in all the varied environments of Mexico. Such research should also involve investigations of any peculiarities of screwworm biology in these new, previously unstudied, environments. These studies would require two bilingual insect ecologists--one for northern and one for southern Mexico.

Research on breeding stocks. The genetic and ecological research mentioned above should tie directly into research to develop new breeding stocks that could be infused into the APHIS operational program whenever needed. Initially, 3 genetically distinct breeding stocks, called production strains, should be developed--each from 20 or more field collected egg masses. Maintenance of genetic purity would require separate rearing facilities. A fourth rearing facility equivalent to those used for the separate strains would be used to develop new colonies and test new procedures. These would be reserve strains, built-up and field tested as candidate replacements for production strains.

Each production strain would be replaced by a newer strain within two years in order to maintain breeding stocks as nearly wild-type as possible. In order to conduct the required research, the production strains would be of such size that they would also provide APHIS with one million eggs per day. APHIS could rear to the adult stage and, by blending the three strains, stock the rearing colony with flies whose offspring would have hybrid vigor. This extremely important activity, directly tying ARS research and APHIS operations, would require one entomologist and support staff for rearing.

The APHIS program would directly and immediately benefit from the genetics studies because the eradication plant would get all of its breeding flies as pedigreed eggs each day. As additional benefits, success will guide other ARS and SAES insect colonizers working with other forms of biological control, such as parasites and predators. Also, fundamental science would benefit since university scientists, not concerned with practical insect control but intellectually curious about evolution, speciation, genetics of behavior, etc., would follow ARS work closely. In the past following ARS research they have expressed special excitement about genetic changes in laboratory populations.





Physiological research. We do not yet have a bait better than decomposing liver for APHIS to use to keep track of fly populations. Liver does not attract male screwworms. While it attracts female screwworm flies, it also attracts huge numbers of ordinary blow flies. This fact alone makes it impractical to monitor eradication progress with fly traps. For efficiency in research, we need a more selective bait. To follow male fly activity, we need a male attractant.

Only one insect physiologist is now on the staff. He is fully occupied with rearing problems and other physiological tests such as flight studies, mating competitiveness, longevity, energy reserves, and fly vigor. Since these studies must be maintained full time, attractants research would benefit from the addition of another physiologist and support staff.

Screwworm problem won't fade away. During the past year, APHIS released 200 million flies per week. And yet, 100 million per week sufficed to eradicate screwworms from the U.S. and protect from reinvasion between 1963 and 1966. Even if the redoubled and dedicated effort of APHIS, combined with our limited but intense research effort, should bring about temporary relief, the problem of having to increase the number of flies released to achieve eradication still exists. Indeed, it appears to be increasing. In addition, USDA needs to prepare for all the new problems that are inevitable with the expanded program in Mexico.





Expanded Application Research for Screwworm

5 SMY at \$65,000 per SMY (Recurring Funds) - - - - - \$325,000

New Positions Needed

- 2 Entomologists GS-12 (Mexico, field)
- 1 Entomologist GS-12 (Physiology)
- 1 Entomologist GS-12 (Laboratory Rearing)
- 1 Biochemist GS-12 (Isozyme studies)
- 1 Technician GS-7 (Laboratory Rearing)
- 3 Technicians GS-5 (Laboratory Rearing)
- 3 Technicians GS-3 (Laboratory Rearing)
- 3 Technicians GS-1 (Fly Sorting)
- 1 Laborer WB-2 (Laboratory Janitor)
- 1 Clerk GS-3 (Office)

Rearing Building and Equipment (Non-recurring Funds) - - - - \$108,300

GRAND TOTAL

\$433,300

APHIS should supply food for larvae and adults and utilities for new building.





## New Building and Equipment for Screwworm Breeding Colonies

80' x 80' building for breeding stocks:

(Estimates by Joe Smithey, APHIS force construction)

|                                                  |               |
|--------------------------------------------------|---------------|
| Building Shell - - - - -                         | \$ 50,000     |
| Electrical, air-conditioning, plumbing - - - - - | <u>25,000</u> |
| Total - - - - -                                  | \$ 75,000     |

### Equipment:

|                             |                |           |              |
|-----------------------------|----------------|-----------|--------------|
| Colony cages (APHIS specs.) | 36 @ \$530 ea. | - - - - - | \$ 19,080    |
| Rearing vats (APHIS specs.) | 21 @ \$130 ea. | - - - - - | 2,730        |
| Vat racks (APHIS specs.)    | 7 @ \$150 ea.  | - - - - - | 1,050        |
| Bacteriological incubators  | 4 @ \$300 ea.  | - - - - - | 1,200        |
| Rearing vats (1/4 size)     | 12 @ \$ 75 ea. | - - - - - | 900          |
| Pupa holding trays          | 48 @ \$ 10 ea. | - - - - - | 480          |
| Larva capture pans          | 56 @ \$ 10 ea. | - - - - - | 560          |
| Media mixers                | 4 @ \$300 ea.  | - - - - - | 1,200        |
| Refrigerators               | 4 @ \$250 ea.  | - - - - - | <u>1,000</u> |
| Total - - - - -             |                |           | \$ 28,200    |

### Equipment for physiology research:

|                      |                |           |          |
|----------------------|----------------|-----------|----------|
| Bioclimatic cabinets | 2 @ \$1700 ea. | - - - - - | \$ 3,400 |
|----------------------|----------------|-----------|----------|

### Miscellaneous rearing equipment:

|                       |                 |           |            |
|-----------------------|-----------------|-----------|------------|
| Small cages           | 100 @ \$ 10 ea. | - - - - - | \$ 1,000   |
| Larva sifters         | 4 @ \$ 75 ea.   | - - - - - | 300        |
| Larva-pupa separators | 4 @ \$100 ea.   | - - - - - | <u>400</u> |
| Total - - - - -       |                 |           | \$ 1,700   |

GRAND TOTAL - - - - - \$108,300







03

THE UNIVERSITY OF TEXAS AT AUSTIN  
AUSTIN, TEXAS 78712

Department of Zoology

August 30, 1973

Dr. R. C. Bushland  
Screwworm Research Laboratory  
P.O. Box 986  
Mission, Texas 78572

Dear Bush,

I enjoyed our brief visit to the Mission lab and the discussion of our screw worm genetic study was most profitable. I was particularly pleased to see Ed Taylor once again. As a result of our conversation on financing the project, Bob Flake and I have prepared a brief summary on how we plan to handle the genetic data from a statistical standpoint.

As I feel that the contributions of Dr. Flake and his graduate student are essential to the success of our genetic program. I will go ahead and pay his graduate student part time stipend for the fall semester. This amounts to \$1,400. This will allow him to start on the project immediately. I hope that this amount can be replaced by the small supplementary grant requested.

As soon as we have the analysis of the laboratory and production strains completed I will send you the results.

Very best regards,

A handwritten signature in cursive script, appearing to read "Jerry".





## Justification of Suplimentary Fund Request.

Preliminary analysis of a number of screwworm strains has established that electrophoretic data are a useful indicator of the genetic changes occurring during the adaptation of screwworms to current mass-rearing conditions. These data also indicate that the mass colonization process has the effect of greatly reducing genetic variability. Such losses which could also reduce the mating success of the flies in nature is undoubtedly the result of intense selection and inbreeding within the production strains.

If a realistic assessment of genetic variation is to be obtained appropriate statistical methods for treating population data must be applied. Such methods have been developed by Dr. Flake over the past five years utilizing chemosystematic characters in plants. It is proposed to modify these techniques to deal with discrete genotypic information of the type obtained by electrophoresis and incorporate an appropriate measure of genetic distance between populations. Several such measures have been proposed recently. Reprints of the most pertinent references on genetic distance and Dr. Flake's populational studies are enclosed.

The statistical methods to be developed for the analysis of genetic structure will be employed to estimate the amount and rate of genetic change that is apparently occurring during the adaptation of wild screwworms to the mass-rearing facility. The results of the study could be incorporated into a quality control program with the goal of monitoring and maintaining a desired level of genetic variability and thus insuring against the lose of competitive behavior traits which may be under genetic control.





Similar statistical techniques can also be employed to analyze the geographic structure of natural populations in order to detect the presence of possibly distinct geographical races. The knowledge of the existence of geographical races is an important factor to consider in designing future sampling programs and for establishing new production strains.

Dr. Flake has agreed to undertake the modification of his statistical technique as indicated above and to apply these methods in collaboration with me to the screwworm studies now underway. Partial support for salaries of a graduate student and partial summer salary for himself are requested. The part-time summer salary will free Dr. Flake from teaching responsibilities so he can devote full time to this project. Travel funds are also requested to cover transportation of Dr. Flake and his student for trips to Mission and to Mexico.

The breakdown of the budget for one year of support is as follows:

Salaries and wages

|                                     |               |               |
|-------------------------------------|---------------|---------------|
| (Ph.D. Student 1/2 time 12 mo.)     | \$4200        |               |
| (Dr. Flake 1 1/2 mo. summer)        | 2600          |               |
|                                     | <u>\$6800</u> |               |
| (Fringe benefits)                   | 625           |               |
|                                     | <u>\$7425</u> | \$7425        |
| (computer time & computer supplies) |               | 275           |
| (travel to Mission and Mexico)      |               | 800           |
|                                     |               | <u>\$8500</u> |





B

# Tex - Mex Fly traps

(APHIS = 4 traps at sheep pens)  
(ARS = 6 traps until 11/9/73)  
7 traps after 11/9/73)

1973

week ending

|       | Trap  | Released |      | Wild |      | Other |     | Female ratio<br>(Released:Wild) |      |
|-------|-------|----------|------|------|------|-------|-----|---------------------------------|------|
|       |       | ♂        | ♀    | ♂    | ♀    |       |     |                                 |      |
| 10/5  | APHIS | 1        | 8    | 0    | 20   | 14    | 600 | 0.40:1                          | 0.40 |
| 10/12 | APHIS | 12       | 212  | 6    | 239  | 110   | 500 | 0.89                            |      |
|       | ARS   | 1        | 93   | 12   | 288  | 78    | 550 | 0.32                            | 0.58 |
|       | Total | 13       | 305  | 18   | 527  | 189   | 050 | 0.58                            |      |
| 10/19 | ARS   | 1        | 15   | 7    | 64   | 12    | 353 | 0.23                            | 0.23 |
| 10/26 | APHIS | 0        | 22   | 1    | 48   | 23    | 700 | 0.46                            |      |
|       | ARS   | 12       | 173  | 25   | 113  | 65    | 400 | 1.53                            | 1.21 |
|       | Total | 12       | 195  | 26   | 161  | 89    | 100 | 1.21                            |      |
| 11/2  | APHIS | 12       | 282  | 20   | 225  | 185   | 600 | 1.25                            |      |
|       | ARS   | 19       | 354  | 50   | 413  | 161   | 000 | 0.86                            | 1.00 |
|       | Total | 31       | 636  | 70   | 638  | 346   | 600 |                                 |      |
| 11/9  | APHIS | 13       | 474  | 24   | 176  | 148   | 000 | 2.69                            |      |
|       | ARS ✓ | 23       | 952  | 43   | 263  | 187   | 800 | 3.60                            | 3.25 |
|       | Total | 36       | 1426 | 67   | 439  | 335   | 800 |                                 |      |
| 11/16 | APHIS | 9        | 624  | 13   | 299  | 354   | 000 | 2.08                            |      |
|       | ARS   | 34       | 864  | 42   | 419  | 184   | 900 | 2.06                            | 2.07 |
|       | Total | 43       | 1488 | 55   | 718  | 538   | 900 |                                 |      |
| 11/23 | APHIS | 5        | 459  | 5    | 233  | 130   | 600 | 1.97                            |      |
|       | ARS   | 23       | 613  | 27   | 444  | 127   | 000 | 1.38                            | 1.58 |
|       | Total | 28       | 1072 | 32   | 677  | 257   | 600 |                                 |      |
| 11/30 | APHIS | 3        | 382  | 8    | 128  | 152   | 400 | 2.98                            |      |
|       | ARS   | 1        | 109  | 6    | 58   | 71    | 500 | 1.88                            | 2.64 |
|       | Total | 4        | 491  | 14   | 186  | 223   | 900 |                                 |      |
| 12/7  | APHIS | 0        | 12   | 0    | 9    | 47    | 000 | 1.33                            |      |
|       | ARS   | 0        | 15   | 0    | 7    | 44    | 900 | 2.14                            | 1.69 |
|       | Total | 0        | 27   | 0    | 16   | 91    | 900 |                                 |      |
|       |       | 168      | 5663 | 289  | 3446 | 2,099 | 803 |                                 | 1.64 |







# APHIS Test area - Fly Traps (4 at sheep pens (6 traps)

| 1973<br>Week ending | Trap  | Released |      | wild |     | other |     | Female ratio     |      |
|---------------------|-------|----------|------|------|-----|-------|-----|------------------|------|
|                     |       | ♂        | ♀    | ♂    | ♀   |       |     | (Released: wild) |      |
| 10/5                | APHIS | 1        | 85   | 0    | 42  | 45    | 767 | 2.02             | 2.02 |
|                     | ARS   | —        | —    | —    | —   |       |     | —                |      |
|                     | Total |          |      |      |     |       |     |                  |      |
| 10/12               | APHIS | 0        | 155  | 2    | 51  | 237   | 000 | 3.04             | 0.73 |
|                     | ARS   | 1        | 93   | 12   | 288 | 78    | 500 | 0.32             |      |
|                     | Total | 1        | 248  | 14   | 339 | 315   | 500 |                  |      |
| 10/19               | APHIS | —        | —    | —    | —   |       |     |                  |      |
|                     | ARS   | 6        | 289  | 7    | 299 | 190   | 250 | 0.96             | 0.97 |
|                     | Total |          |      |      |     |       |     |                  |      |
| 10/26               | APHIS | 3        | 69   | 1    | 92  | 95    | 200 | 0.75             | 1.66 |
|                     | ARS   | 7        | 698  | 24   | 371 | 285   | 200 | 1.88             |      |
|                     | Total | 10       | 767  | 25   | 463 | 380   | 400 |                  |      |
| 11/2                | APHIS | 0        | 94   | 0    | 146 | 168   | 100 | 0.64             | 3.01 |
|                     | ARS   | 43       | 1555 | 58   | 401 | 483   | 900 | 3.88             |      |
|                     | Total | 43       | 1649 | 58   | 547 | 652   | 000 |                  |      |
| 11/9                | APHIS | 5        | 468  | 10   | 54  | 134   | 300 | 8.67             | 3.96 |
|                     | ARS   | 30       | 1091 | 31   | 340 | 343   | 300 | 3.18             |      |
|                     | Total | 35       | 1559 | 41   | 394 | 477   | 600 |                  |      |
| 11/16               | APHIS | 2        | 96   | 2    | 33  | 28    | 500 | 2.37             | 2.54 |
|                     | ARS   | 16       | 802  | 17   | 321 | 280   | 000 | 2.50             |      |
|                     | Total | 18       | 898  | 19   | 354 | 308   | 500 |                  |      |
| 11/23               | APHIS | 3        | 161  | 3    | 63  | 54    | 100 | 2.55             | 2.48 |
|                     | ARS   | 7        | 353  | 11   | 144 | 215   | 100 | 1.63             |      |
|                     | Total | 10       | 514  | 14   | 207 | 269   | 200 |                  |      |
| 11/30               | APHIS | 2        | 62   | 2    | 30  | 53    | 300 | 2.06             | 2.16 |
|                     | ARS   | 0        | 48   | 1    | 21  | 108   | 100 | 2.30             |      |
|                     | Total | 2        | 110  | 3    | 51  | 161   | 400 |                  |      |
| 12/7                | APHIS | 0        | 3    | 0    | 3   | 17    | 000 | 1.00             | 2.43 |
|                     | ARS   | 4        | 70   | 9    | 27  | 80    | 900 | 2.59             |      |
|                     | Total | 4        | 73   | 9    | 30  | 97    | 900 |                  |      |







## Budget for FY 1974

In FY 1963 the Mission nematode research laboratory was established with a budget of \$200,000. For FY 1974 the tentative budget is 256,500. This budget has not only failed to keep up with inflation, but it has not kept pace with the APHIS nematode eradication program that ARS is obligated to support. The APHIS nematode eradication program started in 1963 with an annual budget of 5 million. In FY 1973 the budget was 9 million and, with the Mexico operation included, the FY 1974 budget is approximately 16 million. ARS responsibilities and fiscal needs to support the program have increased in the same proportion.

The increased needs for our research are outlined below:

1. Mexico has added new problems.

In November, 1974 a new rearing plant is scheduled for completion at Tuxtla Gutierrez in the Isthmus of Tehuantepec. This plant is to produce 300 million sterile flies weekly to compete for mates against the wild population of southern Mexico. There is zero research knowledge







regarding specifics on genetics, ecology,  
mating behavior, population density, etc.

for this area. We have done no research  
south of the state of Vera Cruz and neither  
have anyone else. We have very little  
knowledge of screwworms along the whole  
Pacific Coast of Mexico.

2. The eradication effort is in difficulty

Last year there were 96,625 cases of  
screwworms identified in Texas on the basis  
of samples mailed to mission program staff.  
In addition there were many more unreported cases.

This year, aided by a cold winter, the situation  
is not so acute in Texas but Arizona is experiencing  
the worst screwworm year since the  
program started. ARS has reduced some of  
the research capability of its mission <sup>research</sup> staff  
which had dwindled by attrition since 1964  
but the small increases were inadequate  
to find the answers to the problems related  
to screwworm reinvansion of the U.S.

The meager budget of 256,500 cannot  
cope with the added problems in Mexico.

Field tests made jointly with  
APHIS near Tampico and Victoria, Mexico  
in the spring of 1973 showed that only







50% of the wild females mated with sterile males; even though trapping studies showed that sterile flies were outnumbered wild flies more than 300 to 1. The continued increase of screw worm cases in Texas since the end of winter suggests that the released flies are not fully competitive. We do not know why, and we need more scientists to seek answers.

### 3. Need for genetic research.

The literature of insect genetics has many references showing that insects lose field adaptability through natural selection as they become adapted to laboratory colonization and mass rearing. It may be that a loss of competitiveness among sterile flies is due to genetic deterioration in the laboratory. The new technique of isozyme analysis makes available biochemical markers to trace genetic changes in laboratory populations. We need to add to our staff a biochemist to study biochemical variability in our field collections, and to test each generation in the laboratory to assure that those field







Characteristics are maintained.

#### 4. Need for ecological research

We need many field samples of screwworms from southern Mexico and the Pacific Coast for genetic comparison. It is essential that the flies to be sterilized and released in those new areas of Mexico, match the heredity of the populations in which they compete for mates. To collect these field samples of new insect stocks representing varied ecological situations, we need 2 bilingual insect ecologists - one for northern and one for southern Mexico. In addition to field collecting the ecologists would field test strains of sterilized flies for mating competitiveness in all the varied environments of Mexico. The ecologists would also investigate any peculiarities of screwworm biology in these new, previously unexplored environments.

#### 5. Need for physiological research.

The MS-15 entomologist doing laboratory and field studies on screwworm attractants returned in May 1973. The attractants research is far from complete. We do







not yet have a bait better than  
a compound sugar which is not good  
enough for APHIS to use to keep track  
of fly populations. Sugar does not attract  
male ~~surroundings~~ and it is not specific  
for females, but attracts many more  
ordinary blowflies. This makes it impractical  
to monitor eradication progress with  
fly traps. For efficiency in our research  
effort we need a more selective bait and  
to follow male fly activity we need a  
male attractant.

We have only one insect physiologist  
on the staff and he is fully occupied  
with solving problems and doing various  
physiological tests such as flight studies,  
mating competitiveness, longevity,  
energy reserves, and other varied laboratory  
investigations needed to evaluate the  
effects of heredity, rearing procedures,  
dispersal techniques, etc. on fly vigor.  
These studies must be maintained  
full time so another physiologist is  
required for additional research.

b. Laboratory studies on genetics have  
multiple benefits.







The A.P.H.I.S. program would directly  
and immediately benefit from the  
genetic studies because the  
medication plant would get all  
of its breeding flies as pedigreed  
eggs each day.

Entomologists all over the world  
have had the success with screwworms  
as an example to stimulate research  
on the sterile male technique for the  
control of other insects. No other similar  
eradication program has succeeded over  
a huge geographic area, so until  
there is similar success with other  
insects, it is essential that we solve  
the screwworm problems. Otherwise, eradication  
efforts on other insects in the U.S. and abroad  
will lack a model of success.

Academic university scientists  
interested, not in practical insect control,  
but intellectually curious about evolution,  
speciation, genetics of behavior, etc.,  
have followed our work with interest.  
Some have expressed special excitement  
about genetic changes in laboratory  
populations. Our work on chromosome







in maintaining genetic fitness of  
laboratory stocks will enhance  
the reputation of ARS in academic  
circles. Further, success will guide  
other insect biologists working  
with other forms of biological control  
such as parasites and predators.  
7. The screwworm problem won't  
just fade away.

If our intense research effort  
presently underway, combined with  
dedicated work on the part of APHIS  
and a redoubled effort (they have for the  
past year received 200 million plus per week  
while 100 million per week sufficed to  
eradicate screwworms from the U.S. and  
protect from re-invasion during 1963 to  
1966) should bring about temporary relief  
the problem is still there and getting  
bigger. We should get ready for  
all the new problems sure to come  
in Mexico with the expanded programs.  
After that success will have to hold  
the line and perhaps continue to advance  
eradication into Central America.







*gordon*

DEPARTMENT OF BIOLOGY  
THE CAESAR KLEBERG CHAIR IN WILDLIFE ECOLOGY  
**TEXAS A&I UNIVERSITY**  
KINGSVILLE, TEXAS 78363

6 DEC 1973  
B

December 5, 1973

To: Dr. C. M. Barnes  
From: Dr. Richard B. Davis  
Copies To: Drs. B. G. Hightower and R. C. Bushland  
Subject: Role of R. B. Davis in the Remote Sensing  
Project on Screw-worm Eradication

As a result of consultation November 19 with Drs. Hightower and Bushland, the following either has now become apparent to me or represents reenforcements of previous ideas.

1. No amount of highly precise and sophisticated display of remotely sensed environmental data from any test site will be economically or scientifically justifiable unless the level of precision and sophistication of the ground-truth data is nearly equal.
2. Two kinds of ground-truth data are to be collected, but the close liaison between the two tasks that will be required if item 1 (above) is to be satisfied has not been particularized. The two tasks are: (1) estimates, both direct and indirect, of screw-worm populations; and (2) estimates of environmental conditions over the area of the test site. My feeling is that the most fruitful remotely-sensed data will turn out to be that which can follow the short-term dynamics of the environment in some way, so that the whole experiment should be designed to collect all data in the smallest possible time-space units at the highest possible collection frequency.
3. The present level of financing and manning the task of following screw-worm population dynamics within the test site is much too small to provide the variety and precision of estimates required for developing displays commensurate with those for environmental data. Where



Dr. Richard B. Davis



Dr. Barnes  
December 5, 1973  
Page 2

three to four men maximum now apparently are contemplated, up to six to eight, plus equipment, probably are needed.

4. Unless I misunderstand the general scheme, it seems to me that the labor requirements for adequately precise collection of the ground-truth environmental data also have been underestimated. If, contrary to my present level of understanding, one or more of the present Lockheed employees is to be full time on the test site to manage nothing but collection of the environmental data, then no problem may exist on this point, although more than one full time man may be needed if this task is not closely coordinated with the other.

5. Even if some shifting of presently available funds and/or personnel into the ground-truth tasks could be accomplished, a ready supply of labor (Mexican Nationals at technician and worker scale) is not available. Two other possible sources may be worth consideration or reconsideration: (1) use of college students (Chippingo or Monterrey Tech.) through some sort of academically justifiable liaison, such as class projects or individual research papers; and (2) temporary reassignment of personnel from any of the agencies involved.

6. Given the actual personnel structure for the project, as suggested above, then I could serve right away in planning the experimental model, work schedules, data sheets, etc. associated with the screw-worm fly task. Until there are persons available, with whom to work (initially in the field to select the feasible from the list of desired and possible), I can't do much more in this direction except offer the enclosed outline of the desired and possible.

Sincerely,

Richard B. Davis

Encl. (2)

km







POSSIBLE HISTORICAL STUDY OF SCREW-WORM PROGRAM BY  
DR. BARNES' GROUP, USING APHIS DATA BANK AND NASA  
REMOTELY-SENSED DATA BANK  
(Suggested by R. B. Davis)

Calcomp has available a contour-plotter program that can accept either random data points or gridded ones. APHIS has a bank of data (not in useable transform) on time-place of collected screw-worm larvae over northern Mexico and the U.S. They also have transformable data on sterile-fly drops. They may have crude data on relative incidence of screw-worm wounds/herd livestock, by time and place. If NASA has relevant remote-sensed data covering the same times and place, an historical review of the correlation of contours for at least three factors (screw-worm incidence, sterile fly incidence, environmental state) could be reviewed.

Since the APHIS program for eradication of screw-worm flies from Mexico is apt to continue to depend upon a system of inspectors for collection of data on screw-worm infestation incidence, it will become increasingly important to know how useful their data are, and which of their data are most useful. The suggested historical review should shed some light on these important questions.

cc: Dr. Meadows  
Dr. Meyer







OUTLINE OF POSSIBLE DESIGN ELEMENTS THAT COULD  
BE INCORPORATED IN GROUND-TRUTH PHASE OF TEST

I. Time elements for data schedules

A. Frequency of production of completed displays:

1. Must be less than once/20 days
2. Ideal would be daily
3. Practical probably circa once/week

B. Control of lag time between date of data and  
finished displays on once/week data cycle

1. First 3 days of week for data collection
2. Fourth and 5th days for field tabulation,  
collation and transmission of data
3. Sixth and 7th days for developing and  
analyzing displays and making forecasts
4. By doubling effort a forecast could be  
developed once/three days

II. Types of data on screw-worm incidence

A. Herd inspection and treatment--local herds

1. Wound and larvae data

- a. location and number of each kind of livestock
- b. location and number of wounded animals
- c. number of kinds of wounds/wounded animal
- d. number of infested wounds/wounded animal
- e. number of Ch. homin. larvae/infested wound
- f. number of Ch. maccl. larvae/infested wound
- g. number of other larvae/infested wound







2. Egg mass collections from local herds
  - a. number of egg masses/wound/wounded animal
  - b. size/egg mass
  - c. hatchability/egg mass
- B. Overtly wounded and infested animals
  1. Need constant number wounds available per each selected location within test site
    - a. array of locations should be on ecologic basis
    - b. wounded animal must be inspected and treated twice daily (noon and late evening)
  2. Egg mass collection
    - a. twice daily for number of egg masses/location
    - b. number of eggs/mass estimated
    - c. number of hatched eggs/mass estimated
- C. Fly traps
  1. Locate one series on grid basis, plus second series on ecologic basis
  2. Use both liver and pheromone traps at each trap point
  3. Bait and collect on schedule coincident with herd inspection and bait-animal tests
  4. Sort catch for:
    - a. number of Ch. homin./total flies
    - b. number of Ch. maccl./total flies
    - c. number of Ch. homin. females/males





### III. Environmental Data

A. Map area for ecotypes

B. Coordinate scale of estimates of dynamics of environment with those for screw-worms, in both time and space.





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21 DEC 73  
B

UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
SOUTHERN REGION  
SUBTROPICAL TEXAS AREA  
P. O. Box 267  
Weslaco, Texas 78596

December 20, 1973

Subject: Acting Research-Location Leader, Screwworm  
Research, Mission, Texas

To: A. W. Cooper, Deputy Administrator  
Southern Region, ARS-USDA  
New Orleans, LA

As you know R. C. Bushland, Research Leader, Screwworm Research, has elected to retire effective December 29, 1973. His retirement marks a total reduction of research effort on screwworm from six to three SMYs. (G. W. Eddy retired effective June 30, 1973 and R. R. Grabbe resigned effective Sept. 29, 1973.) The attractant research, for all practical purposes, was discontinued with Dr. Grabbe's departure.

With the upcoming executive meeting at Mission, as well as the urgency to maintain a continuous screwworm research program, we recommend that O. H. Graham be assigned to temporary duty to the position of Acting Research-Location Leader for this program, pending the selection of a permanent research leader. G. W. Eddy and R. R. Grabbe's positions also need to be filled, but these two positions can be deferred until after the executive meeting in January. Also, the new permanent research leader should have a strong hand in selecting these two replacements.

I have discussed this assignment with Dr. Graham and he indicated that he is willing to accept a temporary duty assignment to Mission for a period of one to six months, depending upon ARS needs and priorities.

*E. A. Taylor*  
E. A. Taylor  
Area Director

cc:  
L. Henderson  
R. C. Bushland  
O. H. Graham









GRADUATE PROGRAM IN AGRICULTURE

June 28, 1973

DR. EDGAR A. TAYLOR, Director  
Subtropical Texas Area  
Southern Region  
Agricultural Research Service  
U.S.D.A., P. O. Box 267  
WESLACO, TEXAS 78596

Dear Dr. Taylor:

During the very useful trip to Cd. Victoria, Tampico and Valles, Mr. Melis and myself had an ample opportunity to see screwworm work in Mexico and discuss different aspects, including administrative policies with Drs. Bushland, Graham, Hightower and Jones.

As to reimbursement of funds, Dr. Bushland mentioned, that we should send our first claim at the end of June as this is at the same time the end of the fiscal year for the U.S.D.A. From there on the claim should be send every three month.

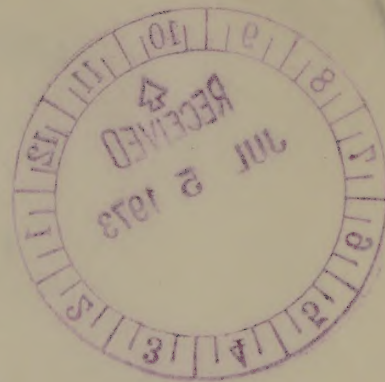
It was also agreed that the claim should be devided only into very general subjects, but that we would keep as many receipts as possible, in case someone wants to look at them.

Attached please find the claim and summary of activities for the period of May 8 - June 30.

Please note the following:

- 1). Mileage includes one trip by Melis from Sonora to Monterrey and travel between here and Mission.
- 2). Travel includes part of Melis expenditures while at Mission, his trip to Tampico and this last trip of both of us to Cd. Victoria, Tampico and Valles.





GRADUATE PROGRAM IN AGRICULTURE

June 28, 1973

DR. EDGAR A. TAYLOR, Director  
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Southern Region  
Agricultural Research Service  
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WESTLACO, TEXAS 75596

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Victoria, Tampico and Valles.



GRADUATE PROGRAM IN AGRICULTURE

June 28, 1973

..... 2

Dr. Edgar A. Taylor

- 3). Expendable supplies includes mostly an advance of spending money, which I gave to Melis for his needs and emergencies during the first weeks of his work in Sonora.

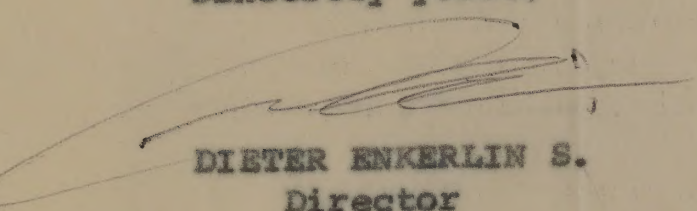
If you need any clarification, please let us know. Since this is the first claim it would be good to know if you have suggestions for changes for this or future ones.

My understanding is that the claim should be send via Dr. Bushland, but as he is away for some time I am sending it to you, hoping for your approval.

The check should be made in the name of the Institute (Instituto Tecnológico de Monterrey), but send to my office.

Best personal regards.

Sincerely yours,



DIETER ENKERLIN S.  
Director

'botg

c.c.: Dr. R. C. Bushland  
Dr. B. G. Hightower  
Dr. O. H. Graham  
Ing. Leonel Robles G.  
Prof. Herón González  
C.P. Jesús Mario Cantú



GRADUATE PROGRAM IN AGRICULTURE



June 28, 1973

..... 2

Dr. Edgar A. Taylor

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Sincerely yours,

DIETER BUKHARIN S.

Director

'botg

C.C.: Dr. R. C. Bushland  
Dr. B. G. Hightower  
Dr. O. H. Graham  
Ing. Leonel Robles G.  
Prof. Herón González  
C.F. Jesús María Cantó



COOPERATIVE AGREEMENT BETWEEN THE INSTITUTO TECNOLÓGICO Y DE ESTUDIOS SUPERIORES DE MONTERREY (Monterrey, N.L., México) AND THE UNITED STATES DEPARTMENT OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE.

Project Nr. 12-14-7001-10

First Report, May 8 - June 30, 1973

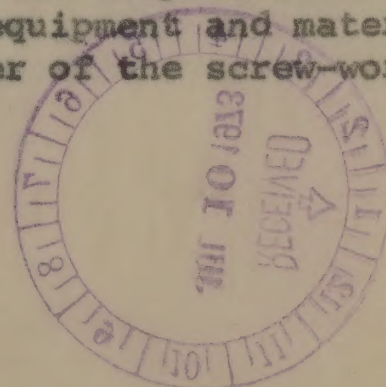
- 1). Ing. Miguel Angel Melis spent some days at Monterrey Tech. for briefing, the scope of work and responsibilities were discussed.
- 2). Mr. Melis underwent practical training at the Mission Center in laboratory rearing of the Screw-worm, trapping and separating flies by species.
  - a). Laboratory rearing consisted of firstly observing different techniques and then actually preparing larval diets with adequate humidity and temperature conditions.- After causing artificial wounds to sheep, these were infested with screw-worm eggs for observing larval development.
- 3). Field Trapping.-
  - a). On a ranch close to Mission traps are tried with different materials to find a more efficient attractant for screw-worm flies. Techniques for servicing these traps were learned. Two field trips, one to Tampico and one additional to Cd. Victoria, Soto la Marina, Tempoal and Valles were made for seeing trapping lines and for helping in servicing them. Attention was paid to the type localities for placing traps.

Wounds of some castrated animals were inspected for screw-worm eggs, but none were found.

On this second trip quite some time was devoted for discussing work in Mexico and administrative matters.
- 4). Separation of C. hominivorax from C. masellaria.

In the laboratory much time was dedicated for learning how to separate the two species of Cochliomyia.
- 5). At Monterrey time was dedicated for arranging the trip to Sonora and organizing all administrative matters. Some equipment and materials were obtained for taking to Sonora. Mr. Fisher of the screw-worm inspection office was visited.

c.c.: Dr. R.C. Bushland  
Dr. B.G. Hightower  
✓ Dr. O.H. Graham  
Ing. Leonel Robles G.  
Ing. Miguel A. Melis





Project No. 12-14-7001-10

First Report, May 8 - June 30, 1973

Ing. Miguel Ángel Melis spent some days at Monterrey Tech. for briefing, the scope of work and responsibilities were discussed.

Mr. Melis underwent practical training at the Mission Center in Lado, factory rearing of the screw-worm, trapping and separating flies by species.

a). Laboratory rearing consisted of firstly observing different techniques and then actually preparing larval diets with adequate humidity and temperature conditions. After causing artificial wounds to sheep, these were infested with screw-worm eggs for observing larval development.

3). Field Trapping.

a). On a ranch close to Mission traps are tried with different materials to find a more efficient attractant for screw-worm flies. Techniques for servicing these traps were learned. Two field trips, one to Tampico and one additional to Cd. Victoria, Tamaulipas, Temporal and Valles were made for setting trapping lines and for helping in servicing them. Attention was paid to the type localities for placing traps.

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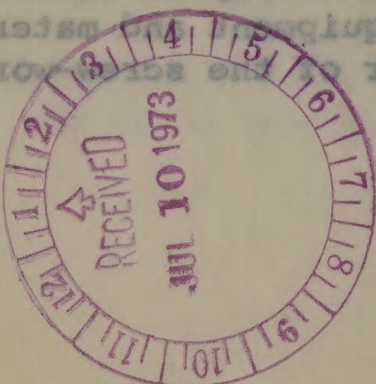
On this second trip quite some time was devoted for discussing work in Mexico and administrative matters.

4). Separation of C. hominivorax from C. nasalis.

In the laboratory much time was dedicated for learning how to separate the two species of Gochistomyia.

5). At Monterrey time was dedicated for arranging the trip to Sonora and organizing all administrative matters. Some edipodid and psyllid were obtained for taking to Sonora. Mr. Fisher of the Agricultural Research Service office was visited.

c.c.: Dr. R.C. Bushland  
Dr. B.G. Hightower  
Dr. G.H. Graham  
Ing. Leonel Robles G.  
Ing. Miguel A. Melis





Note to OH Shakom

Dr. Neck is a recent UT PhD in zoological genetics under Dr. Bush.  
Bush & I talked to Taylor about this proposal over the phone on Dec 14.  
Taylor indicated that he would ensure the support of the existing project at  
UT to employ Neck for 6 mos. In the meantime Neck has filed for a 225-11  
(papers sent to Rosen) and applied for a 225-11 appointment at Mission.  
If ARS can't hire him, APHIS will try to employ him on the basis  
of my conversation with Don Williams on 12/14.

THE UNIVERSITY OF TEXAS AT AUSTIN  
AUSTIN, TEXAS 78712

Department of Zoology

December 18, 1973

Dr. E.A. Taylor, Area Director  
Subtropical Texas Area  
Weslaco, Texas

Dear Ed,

Enclosed is a brief summary of the research Dr. Neck  
proposes to carry out on the screwworm this spring and summer.  
We can expand on this outline if you think it necessary.

I have also enclosed a copy of the letter and justification  
of the supplementary fund request sent to Dr. Bushland in August  
of this year. The funds were requested to cover the costs of  
working out the statistical methods needed for the genetic moni-  
toring program. This work should be completed by the end of  
next summer.

As I pointed out in our telephone conversation I think both  
projects should be funded. Having Neck responsible for collecting  
and processing samples from natural populations will greatly  
enhance the project by permitting us to employ more sophisticated  
and finer grain sampling procedures. Furthermore without the  
assistance of Dr. Flake and his student it will be very difficult  
for me to provide a simple technique for monitoring lab strains  
suitable for use by untrained personnel.

If there are any questions concerning the proposals or their  
budgets between Friday Dec. 21 and Sunday Dec. 29 you can contact  
me at (314) 391-0517 in St. Louis. I will be home from the 29th  
on.

Sincerely yours,

Guy L. Bush  
Associate Professor of Zoology

cc:R.C.Bushland





RAYMOND W. NECK

RESEARCH PROPOSAL

For successful control of the screwworm over large geographic areas, knowledge of the genetic structure of the population of the insect is essential. Populations will be sampled by collection of egg masses from natural populations in northern Mexico. Larvae will be reared to the adult stage, whereupon the flies will be frozen on dry ice until electrophoresing.

The starch gel electrophoresis technique allows examination of gene products at various enzyme loci. Analysis of these genetic markers reveals the genetic structure of the population. Utilization of genetic distance measures produces estimates of the degree of genetic differentiation between various population samples. This technique allows determination of the number of freely interbreeding populations (geographic races) which are present within northern Mexico.

Such information may also be applied towards practical problems in the control of the screwworm by providing a baseline for monitoring genetic changes in laboratory populations.





UNITED STATES DEPARTMENT OF AGRICULTURE  
WASHINGTON, D.C. 20250  
OFFICE OF THE ASSISTANT SECRETARY  
FOR AGRICULTURAL RESEARCH  
WASHINGTON, D.C. 20250

October 20, 1972

Subject: Acting Research Station Leader, Research Station,  
Houston, Texas, Texas

To: A. N. Taylor, Deputy Administrator  
Houston Region, ARS-0024  
Houston, Texas

As you know, Dr. R. D. Bostland, Research Station Leader, Research Station, was elected to retire effective January 10, 1973. His retirement will be a total retirement of \$11,301 per month on retirement from six to three years. Dr. B. Bostland effective June 10, 1973 and Dr. Bostland resigned effective Sept. 29, 1972. The above budget was prepared for the period proposed, was discontinued and is being replaced by a new budget.

BUDGET

|                               |              |
|-------------------------------|--------------|
| Salary- Raymond W. Neck       | \$ 6,000     |
| (@\$1,000.00/month)           |              |
| Fringe Benefits               | 501          |
| Travel(Field trips to Mexico) | 800          |
| Supplies                      | <u>4,000</u> |
|                               | \$11,301     |

I have discussed this budget with Dr. Bostland and indicated that he is willing to accept a temporary assignment to Houston for a period of one to two years, depending upon his needs and priorities.

A. N. Taylor  
Deputy Administrator

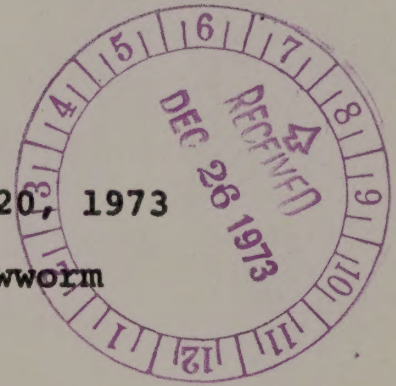
cc: Bostland  
B. Bostland  
A. N. Taylor  
A. N. Taylor





UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
SOUTHERN REGION  
SUBTROPICAL TEXAS AREA  
P. O. Box 267  
Weslaco, Texas 78596

December 20, 1973



Subject: Acting Research-Location Leader, Screwworm  
Research, Mission, Texas

To: A. W. Cooper, Deputy Administrator  
Southern Region, ARS-USDA  
New Orleans, LA

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With the upcoming executive meeting at Mission, as well as the urgency to maintain a continuous screwworm research program, we recommend that O. H. Graham be assigned to temporary duty to the position of Acting Research-Location Leader for this program, pending the selection of a permanent research leader. G. W. Eddy and R. R. Grabbe's positions also need to be filled, but these two positions can be deferred until after the executive meeting in January. Also, the new permanent research leader should have a strong hand in selecting these two replacements.

I have discussed this assignment with Dr. Graham and he indicated that he is willing to accept a temporary duty assignment to Mission for a period of one to six months, depending upon ARS needs and priorities.

*E. A. Taylor*

E. A. Taylor  
Area Director

cc:

L. Henderson  
R. C. Bushland  
O. H. Graham





UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
SOUTHERN REGION  
SUBTROPICAL TEXAS AREA

December 20, 1973

Science  
1515 Massachusetts Ave. N.W.  
Washington, D. C. 20005

Editor:

John Calman and Roger H. Smith (Letters, 23 Nov. 1973, p. 775) commented adversely on the status of the Southwestern Screwworm Eradication Program. This program is conducted by the U.S. Department of Agriculture with the cooperation of livestock regulatory agencies, extension services, and grower organizations in affected U.S. states and Mexico. The program is conducted by USDA's Animal and Plant Health Inspection Service (APHIS), with research support from the Agricultural Research Service (ARS).

There could be many reasons for our recent difficulty in keeping screwworm, Cochliomyia hominivorax, populations from growing and spreading in this country. There are ecological as well as genetic and physiological considerations. Abundant rainfall for the past two years has favored screwworm increase in the warm months. An unusually mild winter in 1971-72 aided survival of this subtropical insect.

The sterile insect release program was designed on the assumption that most growers take good care of their livestock. We believed that the release of 100 million sterile flies per week would overwhelm the native flies that bred in wildlife and neglected domestic animals. Almost complete freedom from screwworms since 1964 has permitted Southwestern ranchers to save more than \$100 million (1962 dollars) annually in costs of labor and insecticides previously spent for screwworm control. When screwworms reappeared in 1972, cattlemen could not immediately return to the ranch practices of 10 years ago. Because of a lack of skilled cowboys, trained cow horses, spray pens, dipping vats, and special holding pastures, ranchers could not prevent screwworm breeding in their herds, so these became a new class of "neglected" livestock.







Starting in 1968, APHIS increased production to 200 million sterile flies weekly, but these numbers, spread over northern Mexico and the adjoining U.S. states, were inadequate for an effective barrier in 1972 and again in 1973. The situation in Texas in 1973 was much better than it was in 1972. In 1973 only an area south of Laredo and Corpus Christi suffered inadequate control. Most of the cases occurred in five counties where an uncontrolled outbreak of Gulf Coast ticks, Amblyomma maculatum, made thousands of cattle unusually susceptible to screwworms. In spite of local failures, chiefly in Texas and Arizona during the past two years, the situation was not as disastrous as Calman indicated. The 1972 infestation north of Texas was minor, occurring late in the season, and was quickly terminated by cold weather. Considering the area of the U.S. subject to screwworm losses before the sterile fly program, the vast majority of animals are still protected, to the benefit of producers, consumers and wildlife.

Although we defend the eradication program for its obvious benefits, ARS is not complacent about the need for supportive research. For those interested in references to investigations, I cite review papers (1, 2, 3, 4) by scientists who have actually done screwworm research and not merely written about it. In this letter I touch on the past year's unpublished research of Mission, Texas entomologists listed alphabetically: APHIS--E. H. Ahrens, E. C. Corristan, A. J. Graham and H. C. Hofmann; ARS--R. C. Bushland, M. M. Crystal, G. W. Eddy, R. R. Grabbe, O. H. Graham, B. G. Hightower and C. M. Jones.

The problems in screwworm genetics cited by Smith have received attention. The APHIS screwworm breeding stock at Mission is not descended from the original Florida colony used at the beginning of the program. To prevent the loss of field adaptation through prolonged laboratory rearing, breeding stocks have been completely changed three times during the course of the program. In 1966 a strain developed from flies collected in Mexico replaced the Florida strain. In 1971 that strain was replaced by another laboratory strain of Mexican origin, and in 1972 a new strain developed from flies collected in Texas at the beginning of the outbreak became the current APHIS production strain.

We made many collections of screwworms from infested livestock at diverse locations in Texas and Mexico during 1972 and 1973 to establish laboratory populations for mating tests in cages. In all tests the laboratory strains have mated with the newly colonized flies. In competitiveness tests, the old laboratory-adapted strains of sterilized males mated more successfully with wild-type females than did fertile wild-type males.







Working jointly with the Methods Development Section of APHIS, we have conducted a series of field evaluations in Texas and Tamaulipas, Mexico. The APHIS-ARS entomological team found in release and trap-back tests that a new strain of flies (designated Tex-Mex) developed from collections made in 1972 at 18 locations in Texas and 6 in Mexico, seemed to migrate farther, faster, and survive longer than the current APHIS production strain. Both strains are now being compared for mating competitiveness against wild flies on 2,000-sq-mi. plots in South Texas.

We have brought many additional collections into the laboratory to breed for genetic and physiological studies. We are combining some of these stocks, attempting to develop a better strain.

Although mild winters, rainy summers, and changed ranch practices have favored screwworms in nature, there may also have been genetic changes in the wild population. Field experiments have convinced me that our sterile males are not now mating as effectively with wild females as we might expect on the basis of tests with caged flies.

I think that the northern fringe of the wild population may have evolved mechanisms that isolate them from sterile flies in the barrier zone. Rearing the larvae on artificial media produces flies visibly different from those that grow in wounds. The sterile flies are not as large as wild flies, and their color is a different shade of blue. There are undoubtedly other deficiencies in artificially reared flies that wild flies might detect. There could also have evolved isolating mechanisms that do not involve rejection of sterile males, but rather factors in dispersal, aggregation or mating behavior that keep wild and sterile flies from intermingling at mating time. We are planning a field release in southern Mexico, where the wild population has not been exposed to sterile flies, and a similar release of sterile flies in northern Mexico to see if there is a difference in the proportion of sterile matings.

We are aided in our work at Mission by geneticists, physiologists, and chemists from other ARS laboratories at Fargo, ND; Kerrville, TX; Florence, SC; and Gainesville, FL who have come here on temporary duty to work under quarantine with fertile flies before returning to their home laboratories to continue analysis of frozen specimens and to experiment with sterile flies shipped to them by APHIS.

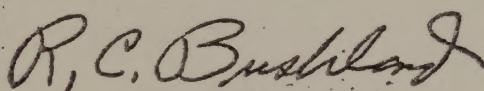






We are further aided by screwworm research contracts with the University of Texas at Austin (isozyme studies in population genetics); Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Mexico (studies on screwworm ecology and collection of new strains in northern Mexico); and Instituto Nacional de Investigaciones Agrícolas, Estados Unidos Mexicanos (INIA) (trapping studies, effects of weather on populations and collections of new strains in southern Mexico).

I regretfully agree with Calman that "no one has gotten to the bottom of it"--but we are digging.



R. C. Bushland  
Research Leader  
Screwworm Research Laboratory  
Agricultural Research Service, USDA  
Mission, Texas 78572

#### REFERENCES

1. R. C. Bushland, Advances in Pest Control Research. 3: 1 (1960).
2. A. H. Baumhover. J. Am. Med. Assoc. 196. 240 (1966).
3. L. E. LaChance, C. H. Schmidt and R. C. Bushland, Pest Control. 4: 147 (1967).
4. B. G. Hightower and O. H. Graham, In Control of Livestock Insects by the Sterile Male Technique. Int. Atom. En. Agency, Vienna. 51 (1968).







For: Science (Letters)

Send proof to:  
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Screwworm Control

R. C. Bushland

Screwworm Research Laboratory, Agric. Res. Serv., USDA,

Mission, Texas 78572

*Hugh;  
A revised version of this  
was sent to Sauer on Dec 21!*

*B*





## SCREWORM CONTROL

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R. C. Bushland

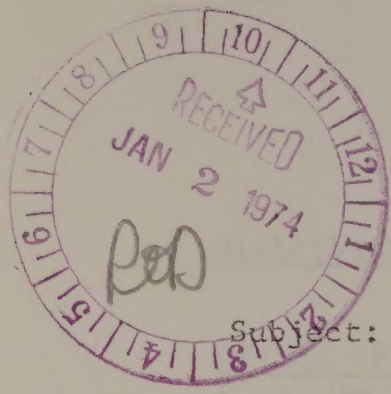
December 5, 1973

Revised December 11, 1973





To 046



UNITED STATES DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
NATIONAL PROGRAM STAFF  
Plant and Entomological Sciences  
Beltsville, Maryland 20705

December 27, 1973

Subject: ARS Program Review of Research on Screwworm  
Biology and Control

To: Those Concerned--Distribution List Attached

A formal review was scheduled at Mission, Texas, for January 21-25, 1974. After it was scheduled we learned that Dr. Bushland, Research Leader for the project, decided to retire in December 1973.

The determination has now been made that a formal review of this program will be postponed. It will be rescheduled after a new RL has been assigned and has become oriented.

In the meantime there are matters that need to be considered in relation to the screwworm research program. The Office of the Administrator has approved an executive conference to be held at Mission on January 22-23, 1974. Attendance will be limited to a small group to facilitate discussion and decision making. We will have some APHIS officials participating in the conference.

Plans are being finalized. We will send further details to the participants in the very near future.

A handwritten signature in cursive script that reads 'L. S. Henderson'.

L. S. Henderson  
Staff Scientist

Enclosure





December 27, 1973

Distribution

Office of Administrator, ARS

R. J. McCracken  
H. O. Graumann  
E. R. Goode

NPS

W. Klassen  
P. Schwartz  
R. C. Fish  
L. B. Altman

PACS

E. L. Corley  
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C. L. Hoffpauir  
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R. C. Bushland  
R. O. Drummond (Attention: O. H. Graham)  
A. H. Baumhover  
R. F. Moore, Jr.

APHIS

F. J. Mulhern  
J. L. Hourrigan  
D. Williams  
R. Bram  
M. E. Meadows

E. F. Knipling, Consultant











REPORT OF NUTRITIONAL STUDIES ON THE SCREWORM  
CONDUCTED AT THE SCREWORM RESEARCH LABORATORY

Mission, Texas

October 29 - December 12, 1973

by

R. F. Moore, Jr. Research Entomologist  
Southeastern Cotton Insects Investigations  
Florence, S. C. 29501





Dr. R. E. Gingrich and I were requested to review the nutrition of the screwworm in a memorandum from Dr. Waldemar Klassen dated Feb. 26, 1973. Dr. Gingrich and I visited the Screwworm Research Laboratory, Mission, Texas in early April 1973 and plans were made to conduct a series of experiments, to begin in the fall and lasting approximately one month. The experiments were to be designed to produce, from a laboratory diet, a fly with the "blue" color and "broad" thorax of the wild or animal-reared fly.

To assist in the experimental design, information on the composition of beef blood, amino acid content of blood and muscle, and an amino acid analysis of screwworm larvae and adults was requested. Dr. Klassen assisted in routing this request to the proper individuals so that the data were available for the experiments.

I arrived in McAllen, Texas on Oct. 28, 1973 and reported to the Screwworm Research Laboratory on Monday, Oct. 29. Dr. Gingrich was also there and after consultation with Dr. R. C. Bushland and Jack Graham, a series of experiments was planned.

The available data indicated that a "wild" type of fly had not been produced, even on the best diets of horsemeat, blood and plasma. Thus, it seemed advisable to attempt to make changes in the "best" diet to determine if it could be modified to produce a wild type fly. Examination of the experiments with horsemeat: blood: plasma diets revealed that the blood or plasma was always diluted with water by a factor of 1/3 to 1/2.

The reasons for the limitation on color, robustness, and larval size of insects from laboratory diets are not known. They may be related to the differences between "living" and "dead" tissue; such differences would be subtle, perhaps complex and difficult to determine. It was felt that a deficiency in some major component of the media, such as protein, minerals or vitamins, should be eliminated as a first step. Therefore, protein as egg albumin, mineral mixtures, or a vitamin mixture were added to the 1000 ml of water and in addition, plasma was substituted for the 1000 ml of water to determine if dilution of one or all of these components determined the type of fly produced from the diets. Availability of food, the accumulation of wastes, and pH were also recognized as possible limitations on the type of fly and some experiments were designed to test these factors.

The original intention was to observe the incidence of blue flies and make some measurements of the thorax as an indication of the success of the modifications of the diet. It was soon apparent that there was considerable variation in the color and appearance in both lab and wild flies and that valid objective measurements of the differences would be difficult. Discussions with individuals associated with the Screwworm Project raised several questions about the color of wild flies and the factor(s) that make the wild fly appear more "broad shouldered" or robust. The incidence of "green" screwworm flies in nature, the size variation and the effect of premature pupation (forced by death of the host) on color and robustness of the flies are other unknowns.







Some individuals felt that there was a color change in the flies after death. This was tested by freezing some laboratory-reared flies, then holding some at room temperature, heating some at 37°C for several hours, and putting others in the sun. Those heated at 37° or exposed to the sun changed to the blue color of the wild fly. Flies which are caught in traps might be exposed to such conditions either in the trap or in the vehicle in which they are transported. Thus, an unknown number of green wild flies may change to blue in the trapping and handling process. Captured laboratory flies might also turn blue and be incorrectly identified as wild.

Dr. Bill Hightower had, in the past, made measurements of the width and length of the thorax of wild and laboratory-reared flies. The ratio of length/width from these data was found to be  $1.02 \pm 0.02$  for 25 wild flies and  $1.05 \pm 0.02$  for 25 lab flies. This is not statistically significant by the  $t$  test. Efforts to find specific characteristics to measure the "robust" characteristic were unsuccessful.

The robust characteristic was thought to be present, even in small wild flies which result from premature pupation. This was discussed with Mr. Calvin Jones and at his suggestion a field trip was made to the King Ranch at Encino, Texas. Larvae in the ears of cattle were obtained; a group of large larvae were forced to pupate without completing their feeding and produced pupae weighing 49 mg. This corresponds to a larval weight of wild flies of approximately 70 mg but would be slightly larger than the usual laboratory-reared larvae. A second group of larvae was about 24 hours old; these were forced into the horse meat diet where development was completed and pupae weighing 53.9 mg were produced. Mr. Jack Graham examined the adult flies from these larvae and compared them with flies that had been reared on sheep, on hydroponic diets, and horse meat diets. Only those from sheep had the appearance of wild flies. Thus, flies which had developed from larvae taken from cattle and forced to pupate prematurely or which completed a substantial portion of their larval development on laboratory diets could not be distinguished from flies reared wholly on laboratory diets. In other words, both blue and green flies were present and they did not have the robust appearance of wild flies. It was concluded that the blue color and broad thorax or robust appearance were difficult to define and were inadequate for evaluation of differences in flies from the experimental diets.

Since the original characteristics were lacking in objectivity, the following methods were selected for evaluation of the flies from the experimental diets: (1) Average larval weight as determined by the weight of 10 larvae which were selected just prior to pupation; (2) Tendency to fly-- this was a modification of a published method for determining the tendency of an insect to fly. Modification of the method, equipment, and initial testing had been done by Dr. M. M. Crystal. This method was applied to the males from each diet in the expectation that flies from the best diets might have a greater tendency to fly; (3) Stress survival-- Jack Graham had done some experiments with the survival of adult flies at 39°C. It was reasoned that survival under this type of stress would be a desirable characteristic and such flies should be found in the best





diets. In the test, 20 male flies that were 5 days old were exposed to 36°C, without food or water for 16 hours and the percent mortality recorded; (4) Categorizing by physical characteristics-- 3 technicians, experienced in the classification of wild and laboratory-reared flies, classified 20 male flies from each diet. A successful diet should show a larger percentage of flies appearing like the wild type.

Examination of the results of the evaluation tests of flies from the Group III diets suggested the possibility that the size of the flies might be a factor in survival under the stress of exposure, without food or water, to a temperature of 36° for 16 hours. Therefore, some measurements of the wet weights of survivors were made immediately at the end of the test. Measurements of the dry weights of the survivors and dead flies were made after drying to a constant weight at 36°C.

Five groups of experimental diets were set up. Each group contained a Standard diet which contained 4 ml formaldehyde, 1000 ml water, 500 ml blood plasma, and macerated horse meat (approximately 1500 gm) for a proper consistency. Unless otherwise indicated, the changes in the diets were to modify the 1000 ml of water by adding egg albumin, minerals, vitamins or by substitution of plasma for the water.

The diets were made up on Friday afternoon and one replicate of each diet was started on Sat., Sun., and Mon. The larvae pupated in 4 days and emerged as adults in 15 days. The adults were tested when 5 days old.

The diets were:

#### Group I\*

1. Standard
2. 0.1% Wesson salts
3. 0.1% Human blood salt mix
4. 0.1% House salt mix
5. 20 ml of Vanderzant vitamin mix

\* Dr. Gingrich determined the osmotic pressure of the salts after the tests were begun and found that 0.9% was more nearly isotonic. It was also found that the vitamins were only 1/3 of that which might be required. Thus, flies from this group were used in an effort to standardize the evaluation procedures.

#### Group II

1. Standard
2. Undiluted plasma
3. 6% egg albumin + amino acids\*
4. 6% egg albumin + amino acids, 0.1% Wesson salts, 20 ml vitamins
5. 6% egg albumin
6. 6% egg albumin + amino acids, 5% dried blood, 0.1% Wesson salts, 20 ml vitamin mix





\* Selected amino acids were added to the egg albumin to make its amino acid composition more like that of bovine plasma.

### Group III

1. Standard - pH not adjusted
2. Standard - pH 7.0
3. 1000 ml citrated whole blood, pH not adjusted
4. 3% egg albumin, pH 7.0
5. 3% egg albumin + Lysine and Phenylalanine\*, pH 7.0
6. 3% egg albumin + Lysine and Phenylalanine\*, pH not adjusted

\* The "protein score" concept was used as the basis for modifying the amino acid composition of the egg albumin. The carcass analysis of larvae reared on sheep was used as the standard and lysine and phenylalanine were the most limiting amino acids.

### Group IV - all diets were pH 7.0

1. Standard
2. 0.9% Wesson salt mix
3. 0.9% Human blood salt mix
4. 0.9% House salt mix
5. 60 ml Vanderzant vitamin mix
6. 3% egg albumin, 60 ml vitamin mix, 0.9% Human salt mix

### Group V - all diets were pH 7.0

1. Standard
2. 6% egg albumin
3. 6% whole egg
4. 12% cottonseed flour
5. Texturized soybean protein, no horsemeat, 6% egg albumin, 0.9% Human salt mix, 60 ml vitamin mix, 500 ml plasma
6. Texturized soybean protein, no horsemeat, 1000 ml of a 1:1 dilution of hydroliquid, 500 ml plasma

## Results

Group II Diets. -- Substitution of plasma for the water or the addition of egg albumin in the water of dilution produced slightly larger larvae (Table 1, diet 2) than did the Standard diet (Table 1, diet 1). However, they were not any larger than some larvae from the Standard diet in other groups (Table 1, Group III, diets 1 & 2; Group V, diet 1). Flies from diet 3 were the least responsive in the flight test (Table 2) and had one of the higher mortalities in response to stress (Table 3). Flies from diet 6 were most responsive in the flight test (Table 2) and had one of the lower stress mortalities (Table 3).





Group III Diets.--Adjustment of the pH to 7.0 did not make any consistent difference in larval weights, flight response, or stress response (Tables 1, 2, 3). Addition of lysine and phenylalanine to egg albumin (diets 5, 6) to correct a theoretical deficiency of these amino acids (based on amino acid analysis of the carcass of larvae which had developed on sheep) did not produce any change in larval weight (Table 1) or flight response (Table 2) but flies from this diet at pH 7.0 did have a higher stress mortality (Table 3).

Group IV Diets.--This group of diets was expected to be the most significant of those tested because the media was adjusted to pH 7.0, the concentrations of vitamins and minerals were adjusted to a more nearly correct amount than those in Group I and some modifications in the techniques to decrease waste and increase the availability of food had been made. Examination of the larval weights, flight tendency and stress response does not show any obvious differences between the Standard and the test diets.

Group V Diets.--These diets were to test the quality of different proteins. The larger larval weights in this group are attributed to the reduced number of larvae per container and the addition of plasma to make the diet more liquid during the last 24 hours of larval development. Larvae from diets 1, 2, and 3 are comparable. Diet 4 with 12% cottonseed flour (CSF) did not support growth beyond 24 hours, reduction to 6% CSF at the end of 24 hours improved growth somewhat and a further reduction to 3% CSF at the end of 48 hours permitted larvae in replicate 3 to mature. The CSF may have some value in diets at 3%. In diets 5 & 6, the texturized soybean protein was substituted for the meat and constituted approximately 50% of the diet; no development occurred on these diets.

The data were examined by plotting flight response against larval weight (Fig. 1). The data are from 18 different diets which might explain the scatter of the points. However, the distribution of the points suggest that the larger flies do have a greater tendency to fly. The use of a single diet and refinement of the flight response test should reduce the variation and confirm this observation.

The same variations from the 18 different diets are present in a plot of the stress mortality vs larval weight. This plot (Fig. 2) shows rather clearly that the mortality is less in flies from the larger larvae.

The survival value of the larger flies is further shown in a comparison of the dry weights of the survivors and dead from the stress test. At the end of the stress treatment period, the survivors were killed by crushing and then both survivors and dead were dried to a constant weight at 36° C for 24 hours and then weighed. It was found in 23 out of 29 comparisons that the survivors weigh more than those killed by the treatment (Table 4).





The wet weight of the survivors in Groups IV and V were determined (Table 5). It is seen that the survivors average about 25 mg or more regardless of the diet or replicate.

The conditions in a wound were simulated by the apparatus in Fig. 3. It provides for a continuous flow of plasma over the larvae to remove the waste products and supply fresh nutrients. Two types of experiments were done with this apparatus. In one, the plasma was made to flow over horsemeat; in another, the plasma flowed through cotton linters. Two groups of larvae from the horsemeat and plasma averaged 84.8 mg in the first group and 90 mg in the second group with the largest larva weighing 95 mg. Those from cotton linters only plus plasma weighed 50 mg.

### Summary

1. Adult flies that have been killed by freezing or other methods will turn blue when exposed to temperatures near 36°C.
2. Wild flies reared on an animal and forced to pupate prematurely cannot be distinguished from media-reared flies.
3. Fresh meat diets and fresh Hydro diets have a pH of 6.0. Diet 24 hours old and "spent" Hydro have a pH of about 7.0. Based on larval weights, adjustment to pH 7.0 of the meat diets did not seem to make any difference in their growth (Group III diets).
4. The addition of protein to the diet was the only change which seemed to affect larval size. The effect of the variables of vitamins, minerals, pH, and even the type of protein appear to be obscured by the limitations imposed by the accumulation of waste products and/or the availability of food (especially during the last 24 hours).
5. Flies from large larvae appear to have the highest response in the flight tendency test (Table 2, Fig. 1) and this may indicate that the larger flies have a greater "biological vigor".
6. The flies from the larger larvae have the lowest mortality in the stress test. Weights of survivors and dead support the idea that the larger flies are the ones that survive the exposure to heat.
7. The findings in 5 and 6 above and Figs. 1 and 2 suggest that flies from larvae that weigh 68 mg or more have a higher flight response, less stress mortality, and probably live longer in nature than those weighing less.





## Miscellaneous

1. One comparison of wild flies reared on cattle with those reared in the laboratory seemed to show a different type of activity and movement. Those from the lab seemed hyperactive with movements that were jerky and excessive. There seemed to be less waste movement in the wild flies. Other observations have not confirmed this but additional observations are suggested; if the type of movement in the lab flies is confirmed, it may indicate a deficiency of thiamine and/or niacin.
2. The question of the toxicity of formaldehyde has been raised on several occasions. If it is toxic, it may be due to its formic acid content. This might be checked and if formic acid is toxic, then the formaldehyde should be stored over calcium chips.
3. It was noted that benzene is used as a killing agent in the traps. Benzene is very toxic to humans and should be used with extreme caution. It is suggested that ethyl acetate be tried as substitute.

## Conclusions

The original goal of producing a wild type of fly with a blue color and robust appearance was not accomplished, but the more general goal of determining if some nutritional changes in the rearing might produce a better quality fly was realized. The results of the studies indicated (1) that the waste products from the larvae probably limits their size, (2) that the lower limit on the size of acceptable larvae should be 65-68 mg instead of the present 60 mg, and (3) that larval size and the mortality resulting from exposure of adult flies to heat stress could give laboratory data that would have a direct relationship to survival in the field and consequently the performance of the released flies in the eradication program.

## Recommendations for Additional Studies

I. Stress Mortality.--The lower survival, under heat stress, of larvae that weigh less than 65 mg (Fig. 2) suggests that low survival of the released flies may have been a factor in the 1972 outbreak of screwworms in Texas.

The stress test appears to make possible the evaluation of the expected performance of the released "mass-reared" flies in the eradication program. It is suggested that first priority be given to refining and standardizing this test and relating the survival under laboratory conditions to survival in nature.

The following points of the test need to be standardized:

1. Optimum age of the fly for testing.
2. Time interval of emergence of adults.
3. Pre-treatment.
  - a. Amount of CO<sub>2</sub> anesthesia and recover time.
  - b. Interval between receiving food and water and the treatment.





4. Exposure temperature.
5. Length of exposure.

Relationship of survival in the lab test to that in nature might be accomplished in 2 ways: (1) Determine the survival of wild or animal-reared flies and use this data as an optimum or goal; (2) produce larvae that vary in size and determine the response of the resulting flies to laboratory stress and compare with the survival of similar flies in a standardized field cage test.

II. Nutritional Experiments. --The normal sized larvae which developed in the apparatus with horsemeat and continuously flowing plasma suggests that larval waste products limit the size of the larvae and also limits the effects of nutritional changes in the diet.

It is suggested that an effort be made to perfect an apparatus similar to that in Fig. 3 for use as a research tool. Dependable regulation of temperature and liquid flow (perhaps intermittent) through the larval medium would allow a more realistic appraisal of nutritional changes in the diet. For example, it was possible to produce 90 mg larvae with horsemeat and flowing plasma. What is the maximum size larvae that would be produced with a flow of Hydroponic fluid through the cotton lintners? Such a device should be able to evaluate the quantity and quality of the ingredients in the Hydroponic diet and determine the most economical diet that would produce the best larvae because the waste products would be removed as a limiting factor. Use of such a flow-through technique would probably also reduce rearing costs by eliminating the need for removal of spent diet.

Efforts should also be made to determine what is in the waste that limits larval growth. Such information could make it possible to neutralize the wastes or remove the toxic component and reclaim the unused nutrients in the spent Hydro liquid.

Acknowledgements. --Many individuals contributed much to this research, both in actual assistance in the work and in discussions of the varied aspects of the screwworm program. Dr. Bushland, Dr. Gingrich, Jack Graham, and Frank Dutley were especially helpful in acquainting me with the screwworm program and providing basic information on the various aspects of rearing screwworms. Dr. Bushland, in addition, provided the necessary materials and facilities for the research. Thelma Jester was also helpful in securing materials and assistance. I greatly appreciate the willingness of Dr. M. M. Crystal to permit the free use of his laboratory space and equipment.

The services of Bob Handke are much appreciated. Bob was dependable in carrying out instructions, performed his duties with a minimum of instruction, anticipated the needs of the program, showed ingenuity in adapting laboratory apparatus to different needs, and he willingly worked additional hours outside the normal work schedule. I believe he is an excellent technician and should be encouraged to further increase his technical and formal training.





Table 1. Average weight<sup>a/</sup> of larvae from experimental diets for the screwworm.

|                                  | Diet | Replicate |      |      | Average |
|----------------------------------|------|-----------|------|------|---------|
|                                  |      | 1         | 2    | 3    |         |
| <u>Group II</u>                  |      |           |      |      |         |
| Standard                         | 1    | 65.8      |      | 69.6 | 67.7    |
| 1500 plasma                      | 2    | 70.4      |      | 75.4 | 72.9    |
| 6% EA + AA                       | 3    | 72.0      |      | 70.0 | 71.0    |
| 6% EA + AA, WS, VM               | 4    | 68.7      |      | 63.9 | 66.3    |
| 6% EA                            | 5    | 77.9      |      | 74.6 | 76.3    |
| 6% EA, WS, 5% DB, VM             | 6    | 56.0      |      | 58.1 | 57.1    |
| <u>Group III</u>                 |      |           |      |      |         |
| Standard, pH Na                  | 1    | 72.5      | 70.7 | 65.8 | 69.7    |
| Standard, pH 7.0                 | 2    | 71.8      | 71.1 | 69.0 | 70.6    |
| Whole blood, pH Na               | 3    | 64.0      | 40.3 | -    | -       |
| 3% EA, pH 7.0                    | 4    | 72.2      | 69.3 | 66.7 | 69.4    |
| 3% EA+Ly, Ph, pH 7.0             | 5    | 68.9      | 68.6 | 66.7 | 68.1    |
| 3% EA+Ly, Ph, pH Na              | 6    | 71.4      | 74.0 | 62.7 | 69.4    |
| <u>Group IV</u>                  |      |           |      |      |         |
| Standard                         | 1    | 66.1      | 72.0 | 65.6 | 67.9    |
| 0.9% WS                          | 2    | 58.2      | 65.2 | 65.9 | 63.1    |
| 0.9% HB                          | 3    | 59.5      | 64.7 | 61.9 | 62.0    |
| 0.9% Ho                          | 4    | 60.4      | 68.8 | 65.3 | 64.8    |
| VM                               | 5    | 65.0      | 63.5 | 72.7 | 67.1    |
| 3% EA, VM, 0.9% HB               | 6    | 60.6      | 60.1 | 59.5 | 60.1    |
| <u>Group V</u>                   |      |           |      |      |         |
| Standard                         | 1    | 74.7      | 77.6 | 74.8 | 75.7    |
| 6% EA                            | 2    | 74.4      | 77.5 | 77.6 | 76.5    |
| 6% Whole egg                     | 3    | 81.7      | 70.6 | 65.6 | 72.6    |
| 12% cottonseed flour             | 4    | -         | -    | 62.5 | 62.6    |
| Textured soybean protein, 6% EA  | 5    | -         | -    |      |         |
| Tex. soybean protein, 50% Hydro. | 6    | -         | -    |      |         |

Miscellaneous

Sheep 95.0 (pupae-78 mg)

Larvae from Apparatus with Plasma Exchange

Test 1 - 68 mg vs 69.7 (larvae)(regular): 53.7 (exchange) vs 50.8 (reg.)-pupae

Test 2 - 51.5 (exchange) vs 53.5 (reg.)-pupae

Test 3 - Meat 84.8 mg      Test 4 - Meat 90 mg- largest 95 mg

Test 5 - Cotton linters 50 mg

<sup>a/</sup> All weights in mg.

Abbreviations: EA=egg albumin; DB=dried blood; VM=Vanderzant vitamin mix;

AA=amino acids; HB=Human blood salt; WS=Wesson salt; Ho=House salt;

TxMx= Tex-Mex strain of flies; Ly=lysine; Ph=phenylalanine.





Table 2. Flight tendency of 5-day-old male screwworm flies; 3 replicates of 20 males each unless indicated otherwise. (Percent responding)

| Diet                                | Replicate |      |      | Average |
|-------------------------------------|-----------|------|------|---------|
|                                     | 1         | 2    | 3    |         |
| <u>Group II</u>                     |           |      |      |         |
| Standard                            | 1         | 45   | 33   | 39      |
| 1500 plasma                         | 2         | 45   | 32   | 39      |
| 6% EA + AA                          | 3         | 40   | 24   | 32      |
| 6% EA + AA, WS, VM                  | 4         | 38   | 32   | 36      |
| 6% EA                               | 5         | 37   | 45   | 41      |
| 6% EA, WS, 5% DB, VM                | 6         | 53   | 48   | 51      |
| Plant                               |           | 20   | 33   | 27      |
| Sheep                               |           | 35   |      | 35      |
| <u>Group III</u>                    |           |      |      |         |
| Standard, pH Na                     | 1         | 47   | 23   | 33      |
| Standard, pH 7.0                    | 2         | 55   | 23   | 32      |
| Whole blood, pH Na                  | 3         | 23   | -    | -       |
| 3% EA, pH 7.0                       | 4         | 51   | 44   | 39      |
| 3% EA+Ly, Ph, pH 7.0                | 5         | 42   | 42   | 43      |
| 3% EA+Ly, Ph, pH Na                 | 6         | 43   | 48   | 41      |
| Plant                               |           | 43   | 27   | 35      |
| <u>Group IV</u>                     |           |      |      |         |
| Standard                            | 1         | 20   | 48.4 | 35.6    |
| 0.9% WS                             | 2         | 15   | 41.8 | 34.6    |
| 0.9% HB                             | 3         | 13.3 | 41.8 | 34.1    |
| 0.9% Ho                             | 4         | 30   | 41.8 | 35.9    |
| VM                                  | 5         | 18.3 | 36.7 | 33.9    |
| 3% EA, VM, 0.9% HB                  | 6         | 25   | 38.4 | 31.7    |
| <u>Group V</u>                      |           |      |      |         |
| Standard                            | 1         | 22   | 48   | 35      |
| 6% EA                               | 2         | 23   | 27   | 24      |
| 6% Whole egg                        | 3         | 20   | 11   | 22      |
| 12% cottonseed flour                | 4         |      |      |         |
| Tex. soybean protein,<br>6% EA      | 5         |      |      |         |
| Tex. soybean protein,<br>50% Hydro. | 6         |      |      |         |

Abbreviations: EA=egg albumin; DB=dried blood; VM=Vanderzant vitamin mix;  
 AA=amino acids; HB=Human blood salt; WS=Wesson Salt; Ho= Housa salt;  
 Ly=lysine; Ph=phenylalanine.





Table 3. Mortality of 5-day-old male screwworm flies after 16 hours exposure (without food or water) to 36°C. 20 males per replicate unless indicated otherwise. (Percent mortality)

| Diet                                | Replicate |     |     | Average |
|-------------------------------------|-----------|-----|-----|---------|
|                                     | 1         | 2   | 3   |         |
| <u>Group II</u>                     |           |     |     |         |
| Standard                            | 1         | 90  | 35  | 62.5    |
| 1500 plasma                         | 2         | 85  | 100 | 92.5    |
| 6% EA + AA                          | 3         | 75  | 100 | 87.5    |
| 6% EA+AA, WS, VM                    | 4         | 60  | 90  | 85      |
| 6% EA                               | 5         | 30  | 89  | 59.5    |
| 6% EA, WS, 5% DB, VM                | 6         | 55  | 70  | 62.5    |
| Plant                               |           | 100 |     | 100     |
| Sheep                               |           | 40  | 55  | 40      |
| <u>Group III</u>                    |           |     |     |         |
| Standard, pH Na                     | 1         | 0   | 60  | 80      |
| Standard, pH 7.0                    | 2         | 15  | 75  | 72.5    |
| Whole blood, pH Na                  | 3         | 75  | -   | 75      |
| 3% EA, pH 7.0                       | 4         | 75  | 85  | 66.7    |
| 3% EA+Ly, Ph, pH 7.0                | 5         | 90  | 95  | 93.3    |
| 3% EA+Ly, Ph, pH Na                 |           | 65  | 75  | 68.3    |
| Plant                               |           | 100 | 90  | 95      |
| <u>Group IV</u>                     |           |     |     |         |
| Standard                            | 1         | 90  | 100 | 83.3    |
| 0.9% WS                             | 2         | 95  | 95  | 95      |
| 0.9% HB                             | 3         | 60  | 85  | 80      |
| 0.9% Ho                             | 4         | 100 | 100 | 100     |
| VM                                  | 5         | 95  | 100 | 97      |
| 3% EA, VM, 0.9% HB                  | 6         | 80  | 85  | 82.5    |
| Plant-TxMx                          |           | 65  | 40  | 52.5    |
| <u>Group V</u>                      |           |     |     |         |
| Standard                            | 1         | 50  | 85  | 65      |
| 6% EA                               | 2         | 45  | 75  | 50      |
| 6% Whole egg                        | 3         | 20  | 65  | 48      |
| 12% cottonseed flour                | 4         |     | 65  | 65      |
| Tex. soybean protein,<br>6% EA      | 5         |     |     |         |
| Tex. soybean protein,<br>50% Hydro. | 6         |     |     |         |
| Plant-TxMx                          |           | 40  | 65  | 56.6    |

Abbreviations: EA=egg albumin; DB=dried blood; VM=Vanderzant vitamin mix; AA=amino acids; HB=Human blood salt; WS=Wesson salt; Ho=House salt; Ly=lysine; Ph=phenylalanine.





Table 4. Dry weights of flies that survived and died from heat stress.  
(Weights in mg)

| Diet                                    | Replicate |      |       |      |       |      | Average |      |
|-----------------------------------------|-----------|------|-------|------|-------|------|---------|------|
|                                         | 1         |      | 2     |      | 3     |      | surv.   | dead |
|                                         | surv.     | dead | surv. | dead | surv. | dead | surv.   | dead |
| <u>Group III</u>                        |           |      |       |      |       |      |         |      |
| 1 Standard, pH Na                       |           |      |       |      | 9.5   | 9.1  |         |      |
| 2 Standard, pH 7.0                      |           |      |       |      | 10.7  | 8.8  |         |      |
| 3 Whole blood, pH Na                    |           |      |       |      |       |      |         |      |
| 4 3% EA, pH 7.0                         |           |      |       |      | 10.2  | 10.0 |         |      |
| 5 3% EA+Ly, Ph, pH 7.0                  |           |      |       |      | 10.3  | 8.9  |         |      |
| 6 3% EA+Ly, Ph, pH Na                   |           |      |       |      | 9.0   | 9.3  |         |      |
| Average                                 |           |      |       |      | 9.9   | 9.2  |         |      |
| <u>Group IV</u>                         |           |      |       |      |       |      |         |      |
| 1 Standard                              | 9.9       | 9.1  |       | 9.9  | 9.9   | 9.4  | 9.9     | 9.3  |
| 2 0.9% WS                               | 9.0       | 8.2  | 8.7   | 8.3  | 9.0   | 8.7  | 8.9     | 8.4  |
| 3 0.9% HB                               | 8.5       | 8.0  | 8.6   | 8.8  | 8.0   | 8.5  | 8.4     | 8.4  |
| 4 0.9% Ho                               | -         | 7.8  |       | 9.3  |       | 9.0  |         |      |
| 5 VM                                    | 9.7       | 8.7  |       | 9.0  |       | 10.0 | 9.7     | 8.7  |
| 6 3% EA, VM,<br>0.9% HB                 | 8.7       | 8.9  |       | 9.1  |       |      | 8.7     | 8.9  |
| Plant(TxMx)                             | 8.7       | 8.5  | 9.3   | 8.4  |       |      |         |      |
| Average                                 | 9.1       | 8.4* | 8.7   | 8.5* | 9.0   | 8.9* | 9.1     | 8.7  |
| <u>Group V</u>                          |           |      |       |      |       |      |         |      |
| 1 Standard                              | 11.2      | 10.1 | 13.1  | 11.1 | 11.2  | 10.9 | 11.8    | 10.7 |
| 2 6% EA                                 | 11.4      | 10.8 |       | 10.4 | 11.1  | 11.3 | 11.3    | 11.1 |
| 3 6% whole egg                          | 12.2      | 11.4 |       | 9.6  | 11.5  | 10.8 | 11.9    | 11.1 |
| 4 12% cottonseed<br>flour               |           |      |       |      | 9.7   | 9.0  |         |      |
| 5 Tex. soybean pro-<br>tein, 6% EA      |           |      |       |      |       |      |         |      |
| 6 Tex. soybean pro-<br>tein, 50% Hydro. |           |      |       |      |       |      |         |      |
| TxMx                                    | 9.0       | 8.2  | 9.5   | 8.1  | 9.6   | 8.0  | 9.4     | 8.1  |
| Average                                 | 11.0      | 10.1 | 13.1  | 9.8  | 10.6  | 10.0 | 11.1    | 10.3 |

Abbreviations: EA=egg albumin; DB= dried blood; VM= Vanderzant vitamin mix;  
AA= amino acids; HB=Human blood salt; WS=Wesson salt; Ho=House salt;  
Ly=lysine; Ph=phenylalanine; TxMx=Tex-Mex strain of flies.

\* Averages do not include values where 100% mortality occurred.





Table 5. The weight of male flies that survived heat stress. (Weights in mg)

| Diet                               | Replicate |      |      | Average |
|------------------------------------|-----------|------|------|---------|
|                                    | 1         | 2    | 3    |         |
| <u>Group IV</u>                    |           |      |      |         |
| 1 Standard                         | 29.1      | -    | 22.1 | 25.6    |
| 2 0.9% WS                          | 26.9      | 25.8 | 27.6 | 26.8    |
| 3 0.9% HB                          | 23.1      | 24.8 | 22.7 | 23.5    |
| 4 0.9% Ho                          | -         | -    | -    | -       |
| 5 VM                               | 25.1      |      |      | 25.1    |
| 6 3% EA, VM, 0.9% HB               | 25.6      | 25.2 |      | 25.4    |
| Plant-TxMx                         | 23.2      | 25.1 |      | 24.1    |
| Average                            | 25.5      | 25.2 | 24.1 | 25.1    |
| <u>Group V</u>                     |           |      |      |         |
| 1 Standard                         | 33.5      | 37.6 |      | 35.6    |
| 2 6% EA                            | 33.9      | 29.9 |      | 31.9    |
| 3 6% whole egg                     | 35.2      | 30.6 |      | 32.9    |
| 4 12% cottonseed flour             |           |      |      |         |
| 5 Tex. soybean protein, 6% EA      |           |      |      |         |
| 6 Tex. soybean protein, 50% Hydro. |           |      |      |         |
| Plant TxMx                         | 25.0      | 26.8 |      |         |
| Average                            | 31.9      | 31.2 |      | 33.5    |

Abbreviations: EA=egg albumin; DB=dried blood; VM=Vanderzant vitamin mix; AA=amino acids; HB=Human blood salt; WS=Wesson salt; TxMx=Tex-Mex strain of flies; Ho=House salt.





Table 6. Comparison of larval weight, stress mortality, and flight response of flies from four different sources.

| Source                                | No. of replicate | Avg. larval weight (mg) | Stress % mortality | Flight % response |
|---------------------------------------|------------------|-------------------------|--------------------|-------------------|
| Sheep - Florida strain                | 2                | 95                      | 53                 | 35                |
| Horsemeat standard-<br>Florida strain | 12               | 70.2                    | 70                 | 62                |
| Hydroponic - APHIS                    | 3                | 61 *                    | 97                 | 31                |
| Hydroponic - TxMx                     | 5                | 61 *                    | 55                 | -                 |

\* Average weight of flies being produced by the Rearing Plant at the time the tests were conducted.





FIG. 1 FLIGHT RESPONSE OF ADULT FLIES IN RELATION TO LARVAL WEIGHT

80.

Group II •  
Group III x  
Group IV o  
Group V ▲

75

70

65

60

56

Larval weight

% Response

20

30

40

50

60

70

80

90

100

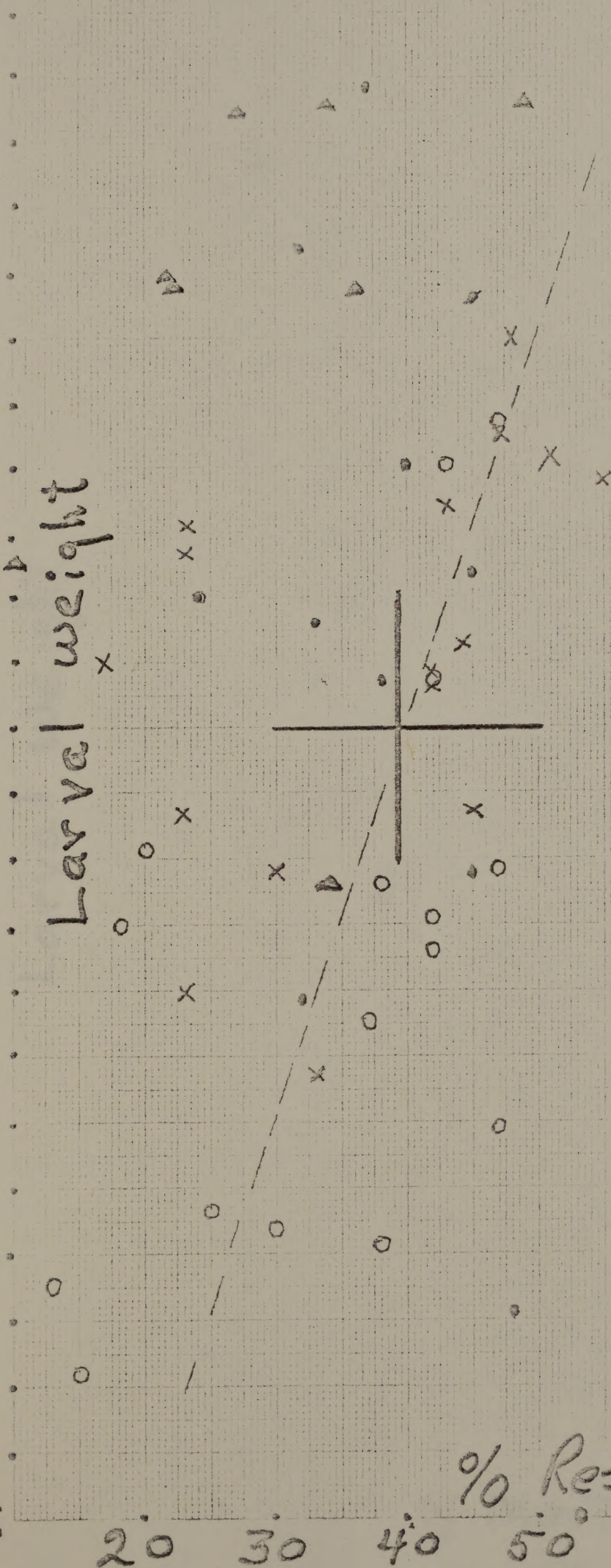








FIG. 2 THE RELATIONSHIP BETWEEN LARVAL WEIGHTS AND MORTALITY OF ADULT FLIES DUE TO EXPOSURE TO 36°, WITHOUT FOOD OR WATER FOR 16 HOURS

80

Group II •

Group III x

Group IV ○

Group V ▲

75

70

Larval weight

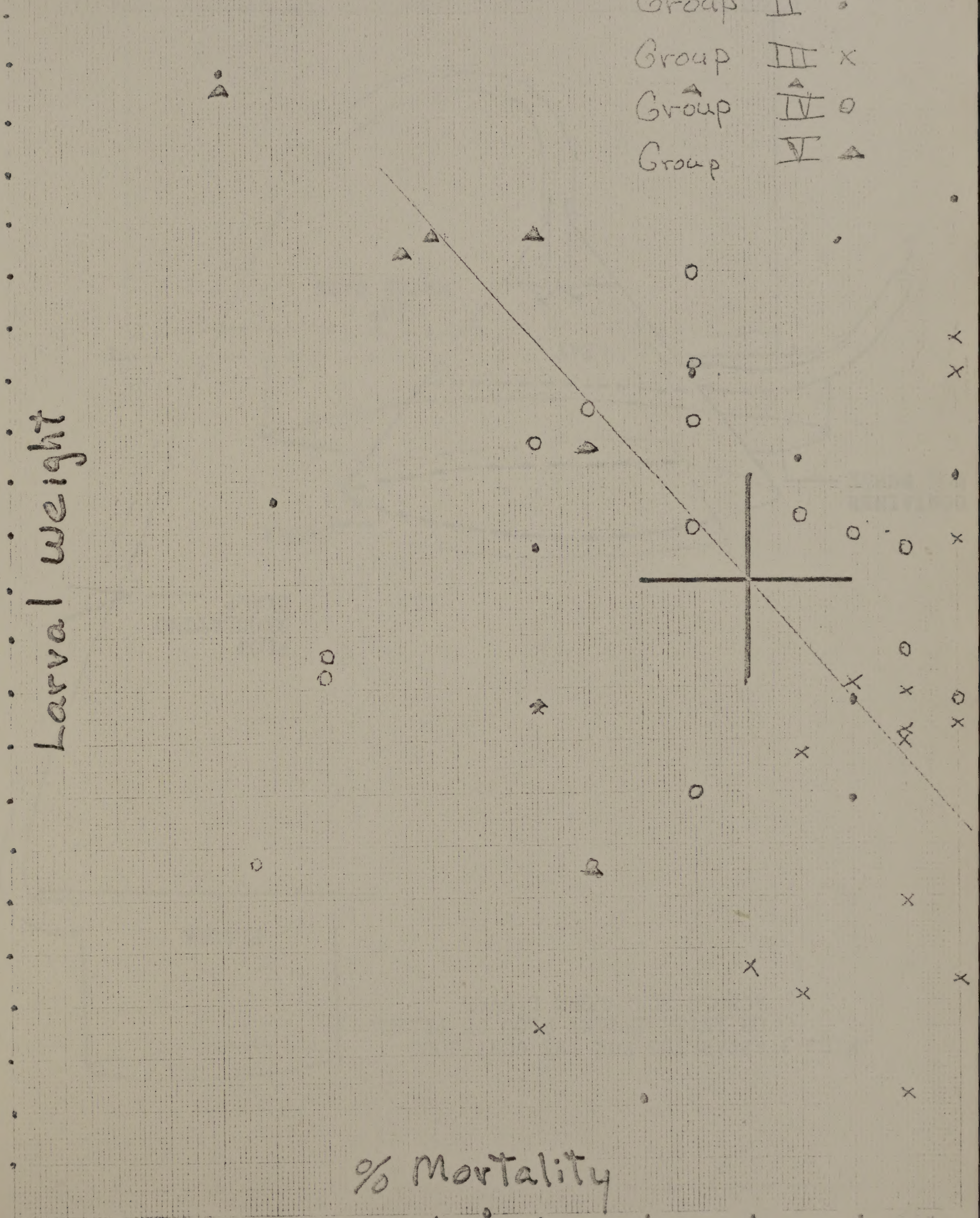
65

60

56

% Mortality

20 30 40 50 60 70 80 90 100









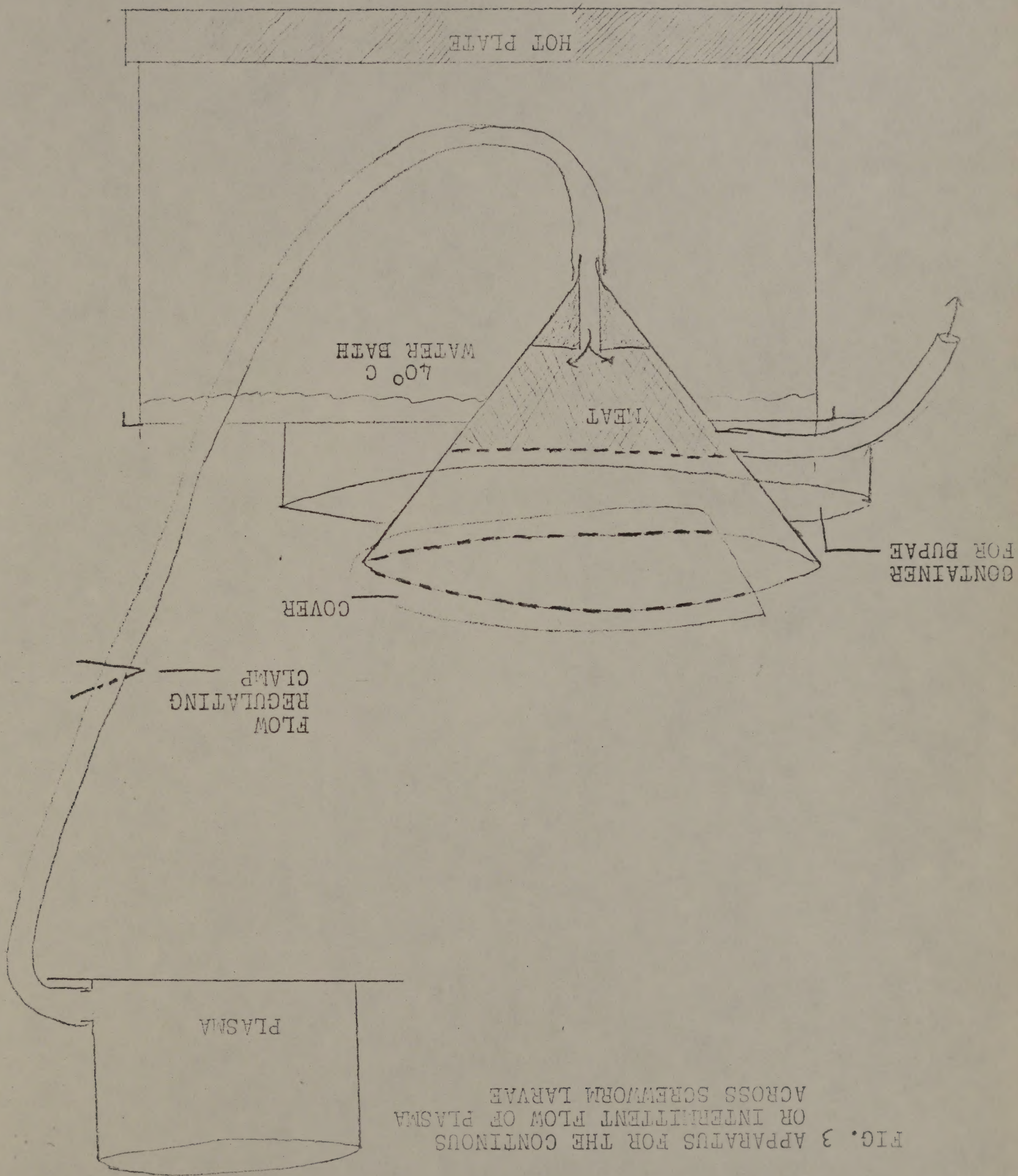


FIG. 3 APPARATUS FOR THE CONTINUOUS OR INTERMITTENT FLOW OF PLASMA ACROSS SCREWORM LARVAE





# **GANADEROS** de MEXICO



Con este  
**TUBO COLECTOR**  
ustedes ayudarán  
a combatir al gusano  
barrenador del ganado!



Tomen unos 10 gusanos de las heridas infestadas de los animales.



Colóquenlos en el tubo de vidrio con alcohol y pongan el tubo en el envase especial.



Envíenlo INMEDIATAMENTE por correo. El envase lleva la dirección del laboratorio que identificará los gusanos.



El rápido envío de estas muestras determinará los lugares donde deben descargarse las moscas estériles que combaten al gusano barrenador.

EXAMINE CON FRECUENCIA SUS ANIMALES  
TRATE LAS HERIDAS CON MATAGUSANO 4072  
ENVÍEN INMEDIATAMENTE MUESTRAS DE GUSANOS AL LABORATORIO!







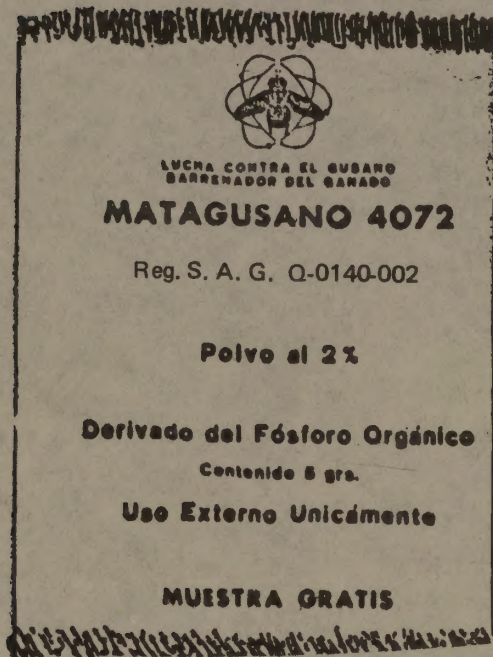
# LUCHA CONTRA EL GUSANO BARRENADOR DEL GANADO

USDA

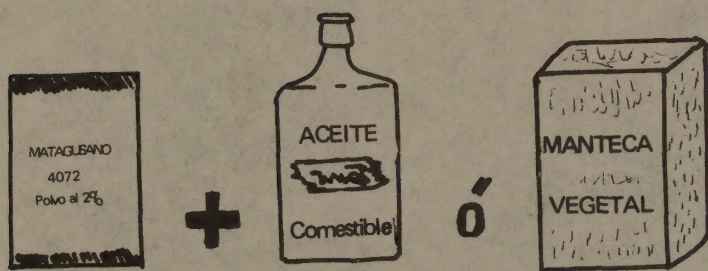
SAG

SR. GANADERO: CON LA FINALIDAD DE CONTROLAR LAS GUSANERAS DE SU GANADO "LA LUCHA CONTRA EL GUSANO BARRENADOR DEL GANADO", HACE LLEGAR A USTEDS EL "INSECTICIDA 4072" CUYA ACCION HA SIDO APROBADA POR LA MENCIONADA LUCHA. EL USO DE ESTE PRODUCTO EN EL GANADO ES MUY EFECTIVO, NO PROVOCA RETARDO EN LA CICATRIZACION DE LAS HERIDAS COMO MUCHOS OTROS MATAGUSANOS. ESTE INSECTICIDA PUEDE APLICARSE EN LAS FORMAS SIGUIENTES:

1.- Aplicando directamente sobre la herida ensangrentada el "INSECTICIDA 4072"



2.- Disuelto en aceite o manteca y embadurnando en la herida con una brochita (LA MEZCLA ES COMO SIGUE:), 1 sobre de INSECTICIDA 4072 de 5 gramos disuelto en 100 mililitros de aceite o manteca. 5 sobres de INSECTICIDA 4072 de 5 gramos en medio litro de aceite o manteca.

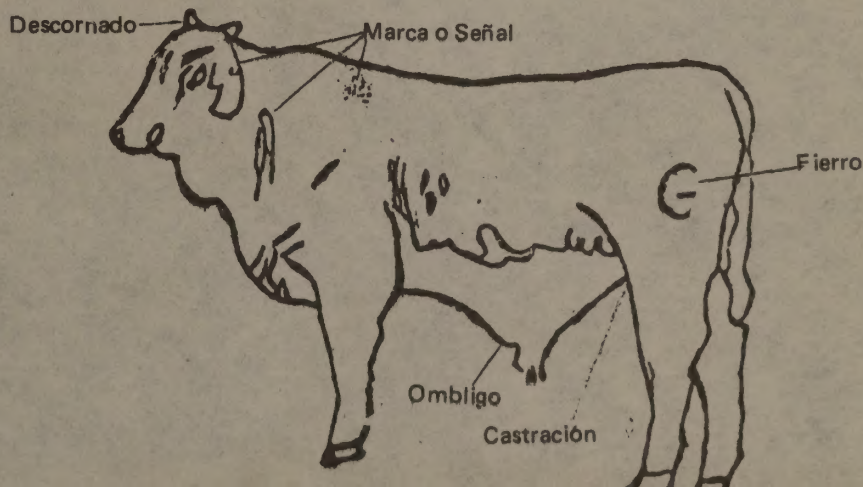


MANTENGA SANOS A SUS ANIMALES COMBATA AL GUSANO BARRENADOR DEL GANADO TRATANDO TODAS LAS HERIDAS PARA PREVENIR LAS GUSANERAS.

**HERIDAS COMO LAS DEL DIBUJO Y ADEMAS LAS SIGUIENTES:**

|               |                           |
|---------------|---------------------------|
| Cáncer al Ojo | Trasquilla                |
| Cortadas      | Corte de Cola             |
| Alambradas    | Heridas de cualquier tipo |

**EL INSECTICIDA 4072 SE PUEDE OBTENER EN:**  
ASOCIACIONES GANADERAS LOCALES, UNIONES REGIONALES GANADERAS, PRESIDENCIAS MUNICIPALES, COMISARIADOS EJIDALES E INSPECTORES DE LA LUCHA CONTRA EL GUSANO BARRENADOR DEL GANADO.









# Man found dead at Bishop identified

**Caller-Times News Service**  
BISHOP — A man found dead beside a flatbed truck near here Friday has been identified as John J. Shuman, 57, a commercial fisherman from Port Aransas.

Nueces County Medical Examiner Dr. Joseph Rupp said death appeared to be from natural causes but a ruling was pending.

## Screwworm lab has first break

**Caller-Times News Service**  
MISSION — For the first time in 299 days not a single screwworm sample was received Monday at the Mission Screwworm Eradication Laboratory.

For the past 10 months every day at least one and frequently more than 1,000 samples were received at the laboratory to be identified.

The past 10 months has seen the worst epidemic of screwworm in the past 10 years.

Dr. James Novy, veterinarian in charge of field operations, said some 95,600 samples were tested at the laboratory. The flies were found in Texas, Arizona, New Mexico, Oklahoma, California, Arkansas, Florida and Louisiana.

## Sentence given in rape trial

A 105th District Court jury yesterday sentenced John Henry Taylor Jr. to 10 years and three months in prison.

Shuman's body was found near the small truck, which was stuck in mud, near a drilling site on a dirt road just east of here.

Rupp said it appeared the man became exhausted while trying to free the truck, collapsed and died.

Shuman reportedly was returning to Port Aransas Thursday night after a trip to Port Mansfield.

A resident of Port Aransas 35 years, he was a member of the Calvary Baptist Church there.

Funeral services will be at 2 p.m. Sunday in Marshall Funeral Chapel in Aransas Pass. Burial will be in Port Aransas Cemetery.

Survivors include his wife, Thelma; four sons, Charles, Joe and Elmer Shuman, all of Aransas Pass, and Jim Shuman of McAlester, Okla.; four daughters, Mrs. Rose Mary Adams of Aransas Pass, Mrs. Ruth Brown and Mrs. Roxie Brown, both of Los Angeles, Calif., and Miss Tassie Brown of Aransas Pass; his mother, Mrs. Pearl Shuman of McAlester, Okla.; a brother, J. B. Shuman of McAlester, two sisters, Mrs. Pauline Kinyon of McAlester and Mrs. Frances Crawley of Hartshorne, Okla., and eight grandchildren.

## Lack of power

Som  
Nuer

Mrs. Mary  
RUNG  
Elizabeth  
4 p.m. Th  
hospital a  
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all of Bay  
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## WORRIED? JUST LOOK BACK TO LAST YEAR

Even though screwworm attacks are picking up steam as the annual northward migration from Mexico begins to arrive at the Rio Grande, it requires only a brief backward glance to see how much worse the situation could be.

Twenty-six cases were confirmed in Texas during April, raising the count for the year to 85. Bad enough. But just a year ago it would have only brought a sigh of relief from livestock producers. There had been 1,011 positive confirmations by the Mission Lab in Texas alone, including 896 in April.

Officials at the lab continue optimistic about the present Texas situation--but the weather in the next three months can bring rapid changes.

A hot dry summer would mean "a very good year, maybe like 1969 which began like this one and ended up with only 161 cases," recalled Dr. James Novy, veterinarian in charge of field operations. Ominously perhaps, 1973 also reminds Novy of '68, which became a disaster after a good start when a warm damp summer spawned a tornado of infestations in the fall, turning it into the worst year since the all-out epidemic of 1962 with 9,268 cases.

Novy said two recent cases in San Saba County and one in Llano County were probably shipped in from South Texas. Although they were found on native animals, the movement of livestock from the Rio Grande Valley had been heavy along highways bordering pastures where outbreaks were found. "It's still too early in the season for migration to have reached those areas," he declared.

He also revealed that:

Sterile fly releases in South Texas had been doubled to 3,000 per square mile per week, in addition to the "hot spot" drops on individual premises.

Arizona, which could be a real trouble spot this summer, had suffered seven infestations during the month and that the first case in New Mexico was confirmed as the month ended.

Despite the fact that a year ago Arizona had 19 outbreaks during April and 29 in the first four months compared to this year's seven to date, Mission Lab officials are pessimistic about the situation. "The cold weather out there has just slowed down the migration, that's all," Novy said. "Northern Sonora in the Republic of Mexico is overrun with screwworm cases, and we expect a rough summer in Arizona; perhaps even worse than last year."

New Mexico had its first outbreak a year ago in April, too, as did California. No cases have been identified in California so far in '73.

Including the two southwestern states, the confirmed U.S. screwworm tally for the year was 93 cases at month's end.

## NON-SCREWWORM SAMPLES

Although the 508 non-screwworm samples received at Mission Lab from seven states was not a record, it was the largest receipt since 1969 when 632 samples



arrived. Texas producers mailed in 459 of them and Arizonans 31. No other state submitted as many as 10.

#### STERILE FLY RELEASES

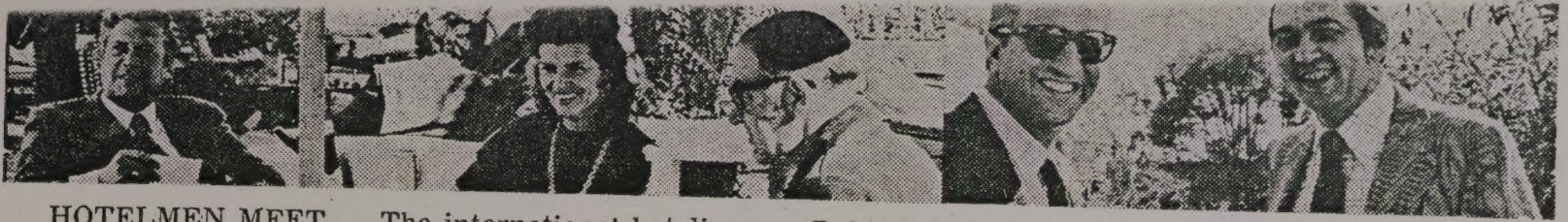
More than 735-million sterile flies were released over the U.S. and Mexico, with the Republic receiving 460-million of them. Texas got most of the rest--257 million--and Arizona and New Mexico received lesser amounts.

All confirmed cases are being hotspotted with immediate drops of 250,000 sterile flies and a like number each week for six weeks in an intensive effort to overwhelm the native population.

Worm samples should be sent to the Mission Lab, Box 969, Mission, Texas 78572. Samples kits are available from county Extension agents and many veterinarians.

-jlf-





**HOTELMEN MEET** —The international hoteliers group known as Innkeepers International met in nearby San Juan del Río, Querétaro, at that city's La Mansión hotel to discuss new tourism promotion plans for Mexico. In photo at left are Jorge

Rubio López of the Hotel Montejó in Mexico City and his wife as well as John A. Martin of the Inn of Golden West at Odessa, Tex., In photo at right are Piero Ricci of the Hotel La Mansión and Neil Hospers of the Worth Hotel in Fort Worth, Tex., president of the group.

## Cuba Returns CMA Hijack Loot

Cuba has returned four million pesos, 16 submachineguns and two pistols as well as several rounds of ammunition taken from Mexico last Nov. 8 by the hijackers of a Mexicana Airlines jet from Monterrey to Havana, the Foreign Relations Secretariat said Wednesday.

The money and the arms were handed over in Havana by Cuban Foreign Minister Dr. Raúl Roa to Mexican Ambassador Víctor Alfonso Maldonado, a brief statement from the secretariat said.

Cuba had promised last month to return the money taken as ransom for the lives of aircraft passengers and the guns which were provided by the Mexican government while the hijacked plane was stationed on a platform at the Monterrey airport.

Mexico also had asked for the extradition of the five hijackers and prisoners

released from Monterrey and Mexico City jails at the time of the hijacking.

Mexico last week returned 70,000 dollars to Haiti extorted by the kidnapers of the U.S. ambassador and U.S. consul to the Caribbean island nation.

The kidnapers and an accompanying group of freed political prisoners came to Mexico carrying the money. Haiti had asked for the return of the money and extradition.

Mexico has declined comment on the extradition

request, although officials said the case of each of the kidnapers and prisoners would be examined individually.

Interior Secretary Mario Moya Palencia later said the Haiti group desires to go to another country.

## Screwworm Plague Worsens

Last year the spread of screwworms in Mexico and the United States made its biggest headway in 10 years, the head of Mexico's campaign against the insect said here Wednesday. Dr. Marco A. Villaseñor spoke at the second annual meeting of animal health in the National Medical Center.

About 33,000 cases of screwworm infection in cattle were reported in Mexico in 1972, with three times

that number in the United States, he said.

A distribution station for sterile screwworm flies has been set up in Tampico and will operate until the end of April, the Agriculture and Livestock Secretariat said. It will distribute 40 million flies per week.

A permanent station is planned to start breeding and sterilizing screwworm flies in three ships off Salina Cruz, Oaxaca, in mid-

1974. It will produce 300 million flies per week, the secretariat said.

Dr. Villaseñor listed several reasons for last year's screwworm invasion. The 1971-72 winter was mild, permitting a larger increase in the screwworm population, he said. Early rains gave the insects a headstart in breeding.

Also, he said, ranchers did not adequately treat screwworm infestations in their cattle because the insect had not caused much damage for the last two years.

Finally, the idea of using sterile flies to mate with female screwworms did not work out as well as had been hoped.

Emergency measures to stem the advance of the screwworm included doubling, tripling and quadrupling the number of sterile flies released in Tamaulipas, Sonora and Nuevo León states last November and December. More workers have been hired in the north to combat the screwworm, more cattle are being treated with preventive measures and more insecticides are being distributed, the secretariat said.

## Weather Report

Northern Mexico warmed rapidly Wednesday, with lows in the 40s and 50s along the border. Highs were in the 70s. But clouds ranged across the region, accompanied by light showers. Ciudad Juárez had snow. Rains were heaviest in the northeast corner of

the country.

The rest of the nation was clear, except for overcast skies in Yucatán.

Mexico City was hazy much of the day, with an official high of 75. Low was 37, but frosts were reported in the foothills surrounding the Valley of Mexico. Puebla

had a low of 32, with 39 in Pachuca, but Guadalajara and Guanajuato were in the 40s.

A high of 82 was reached in Tapachula, near the Guatemala border.

Temperatures will be on the rise today in the central states the Gulf Coast and the Yucatán Peninsula, the Agriculture Secretariat said. Light rains are expected for parts of the Atlantic and Pacific Coasts.

IN THE UNITED STATES, temperatures dipped below zero in some parts of New York State as cold air in-

### TEMPERATURES

#### MEXICO

| High | Low |
|------|-----|
| 86   | 68  |

#### UNITED STATES

| ATLANTA | 58 | 30 |
|---------|----|----|
| BOSTON  | 29 | 10 |
| BUFFALO | 28 | 11 |
| CHICAGO | 42 | 25 |
|         | 78 | 48 |
|         | —  | —  |



